



Asset Manager

Administration and Usage Manual



CONTENTS

Asset Manager	1
Administration and Usage Manual	1
Trademarks	10
Copyright Statement	10
Overview	1
RFID Technology	2
RF Code Software and Hardware Overview	4
RF Code Readers	5
RF Code RFID Tags	6
RF Code IR Locators	6
RF Code Active RFID Tags	6
Prerequisite Reader Configuration	7
RF Code Zone Manager	7
Licensing Overview	10
Asset Licenses	10
Licenses for Advanced Features and Modules	12
Installing Asset Manager	12
System Requirements	12
Install Asset Manager in Windows	16
Install with Microsoft SQL Server Professional	18
Configure a Production Database	19
Asset Manager Directory Structure and Files Present after Windows Installation	21
The System Properties File	21

Install Asset Manager in Linux	22
Asset Manager Directory Structure and Files Present after Linux Installation	25
Install with PostgreSQL	25
Getting Started with Asset Manager	25
Configuring Asset Manager	26
Asset Manager Web Interface	27
Adding Licenses	33
Adding and Configuring Readers	35
Adding Tag Groups	39
Assets	41
Managing Assets	41
Adding Assets Individually	43
Environmental Monitoring with Sensor Tag Assets	46
Creating an Asset Export File to Import Assets in Bulk	47
Configuring an Asset Export File to Populate and then Import	49
Importing Assets	51
Data Schema	51
Asset Types	55
Viewing Asset Types	56
Deleting Asset Types	61
Asset Templates	61
Creating Folders for Asset Templates	65
Locations and the Location Hierarchy	66
Best Practice for Location Hierarchies	67

Add New Location	68
Add Attribute to Location	68
Expected Location	69
Configuration for Unknown Locations	70
Add a Rule to a Location	71
Rule Types and Configuration Options	73
Summary Assets	75
Working with Summary Assets	76
Associating Locations to Assets	81
Associating a Location to a New Asset	82
Associating a Location to an Existing Asset	83
Editing a Location Associated with an Asset	84
Removing the Association of a Location to an Asset	84
Asset Attributes	85
Asset Attributes	85
Attribute Types and Descriptions	88
Custom Attribute Types	100
Creating New Custom Attribute Types	101
Status Attributes	103
Calculated Asset Attributes	104
Conditional Formatting with Attributes	113
Configure Conditional Formatting for Attributes	114
System Notifications	119
Overview of System Notifications	119

SMTP and System Notifications	121
Configuring SMTP	122
Events	124
Event Actions	124
Copying Event Actions	136
Testing Event Actions	136
Deleting Event Actions	136
Event Triggers	136
Event Filters	138
Alerts	140
Alert Viewer	141
Alert Actions	142
Copying Alert Actions	148
Testing Alert Actions	149
Deleting Alert Actions	149
Alert Thresholds	149
Alert Filter	152
Global Alert Policies for Alert Actions and Thresholds	154
How to Set Up Some Specific Alerts	154
How to Set Up a Serial Asset Alert	154
Patlite RS-232C Commands	156
How to Set Up a Humidity Alert Email for Existing Temperature and/or Humidity Tags	158
How to Set Up an Offline Asset Alert	160

How to Set Up a Temperature Alert	163
How to Set Up an Asset Online Alert	165
Reports and Graphs	169
Reports and Graphs Overview	170
Reports	171
Manage Reports	172
Report Schedule	183
Report Actions	184
Report Filters, Post-Conditions, Exception Conditions, and Columns Settings	186
Running and Viewing Reports	189
Exporting Reports	190
Deleting Reports	190
Graphs	191
Manage Graphs	191
Graph Schedule	198
Graph Actions	199
Graph Filters, Post-Conditions, Columns, and Appearance	200
Running Graphs	204
Filtering Graphs	205
Viewing Graphs	206
Deleting Graphs	206
Actions for Use with Reports and Graphs	206
Configure Email Actions for Reports and Graphs	207
Configure FTP Actions for Reports and Graphs	208

Configure HTTP Post Actions for Reports and Graphs	209
Maps	211
Creating Maps	212
Creating and Using Map Hot Spots	214
Map Views	218
Dashboards	223
Overview of Dashboards	223
Create a Dashboard	226
User Accounts and Security within Asset Manager	229
User Accounts, Roles, and Permissions	229
Overview of Groups	232
Access Control	237
Advanced Asset Security	239
Asset Links	240
User Audit Trail	247
Integrating with LDAP / Active Directory	248
Statistical Computation Engine	256
Licensing	256
Create a Statistical Pack	258
Create a Statistical Policy	258
Adaptive Alert Thresholds	259
Integrating with RF Code IR Locators	261
Integrating with PDUs and CDUs	262
Using RF Code Sensor Tags with PDUs and CDUs	263

Installing PDU/CDU Sensor Tags	263
Adding PDU/CDU Sensor Tag Assets	263
Creating a Custom PDU View	265
Integrating with ServerTech's Sentry Power Manager (SPM)	269
Integrating with JMX, BACnet, Modbus, and NetBotz	271
Integrating with JMX	272
Integrating with BACnet	276
Integrating with Modbus	280
Integrating with NetBotz	285
Standard Approach to Troubleshooting	289
RF Code Support Knowledge Base	290
Log Files	290
Admin Console and User Console Task Overview	I
Admin Console Task and Sub-Task Matrix	I
User Console Task and Sub-Task Matrix	VIII
Displaying Values in the English or Metric System	X
Reader Configuration with the Reader Configuration Utility	XI
Reader Configuration with the Reader Web Interface	XII
RF Code Tag Group Codes, IDs, and Treatment Codes	XVI
Advanced Reader Configuration	XVII
Default Asset Schemas	XXIII
V4.1_Sensor_Tags_Only_Schema	XXIV
Schema Details	XXIV

V4.1_Comprehensive_Schema	XXX
Schema Details	XXXI
User Role Matrix	XLI
Using Macros	XLIV
Calculations and Functions Matrix	XLVIII
Network Security with RF Code Readers and Asset Manager	L
Exporting and Importing	LVII
The Asset Manager Data Model	LXVII
Allocating Memory to Asset Manager	LXXIII
Backing Up and Restoring the Asset Manager Database	LXXIII
Upgrading Asset Manager	LXXV
Migrating the Asset Manager Server Application	LXXVII
RF Code Support and Professional Services	LXXVIII

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RF Code, Inc.
9229 Waterford Centre Blvd.
Building 500
Austin, TX 78758
www.rfcode.com



Chapter 1

Overview

Asset Manager™ is an enterprise-class software application. It is a highly scalable asset tracking and asset management software solution that is tightly integrated with RF Code's Real-Time Locating System (RTLS) readers and asset tags. It is also an advanced environmental monitoring software solution that is tightly integrated with RF Code's line of wire-free environmental sensors.

Asset Manager combines powerful, yet easy-to-use tools for configuring locations and asset hierarchies, creating comprehensive views of how critical assets are deployed across departments, buildings, or entire organizations. All current and historical Asset Attributes, such as financial information, physical location, and contractual information can be maintained in a database, enabling complete asset life cycle management. Inventory reports are available at the touch of a button so users can proactively respond to audits and automate their regulatory compliance efforts.

When deployed with RF Code's active RFID tags and readers, physical asset location is tracked in real-time to quickly locate and identify equipment for maintenance and service, avoiding costly downtime. Automated alerts and reports can be configured for immediate notification of asset location or condition changes, delivering savings in both cost and time.

Asset Manager's secure browser-based web interface requires no software to be installed or maintained on user systems, and role-based user accounts make it easy for system administrators to control who can view and who can modify asset details and conditions within the deployment environment.

RF Code Asset Manager, combined with RF Code's active RFID hardware, provides an end-to-end solution for real-time asset tracking and environmental monitoring. In addition, Asset Manager can greatly enhance existing DCIM systems.

xxx-yyy	DRAFT 1	7/2/2015
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The major components of the Asset Manager system are:

- Active RFID tags
- RFID tag readers
- IR locators if desired
- The Asset Manager server
- The Asset Manager web interface
- Zone Manager(s)

The following sections are provided to give you a deeper understanding about RFID technology and use in general as well as technical and operational details about RF Code hardware. If you want to begin using the RF Code Asset Manager system, you can skip these sections and jump to the [Licensing](#) section, which is immediately followed by installation instructions for Asset Manager.

RFID Technology

Radio frequency identification (RFID) technology uses radio waves to identify objects. A radio transmitter (called a tag) is attached to the object to be identified. A radio receiver (called a reader) decodes and reports the tag transmissions within its coverage zone. The reader forwards this information over wired or wireless networks.

Each RF Code tag has its own on-board power supply, a CR2032 coin cell battery. Tags operate with a very low duty cycle; every 10 seconds, the tag wakes up and broadcasts a very short status message at 433 MHz before it sleeps again. The tags are one-way transmitters. RF Code readers are dual-channel receivers tuned to receive signals at 433 MHz. They do not use high-powered radio or magnetic fields to energize or trigger the tags in any way.

Typical RFID applications include item tracking, inventory control, asset management and environmental monitoring. A specific example is the tracking of servers and network equipment in the data

xxx-yyy	DRAFT 2	7/2/2015
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center. The impact of RFID on IT systems depends on three factors: the power of the transmission, the distance from the emission source, and the type of equipment in the path of the transmission.

RF Regulatory Compliance and RF Transmissions Safety

Transmission power is strictly regulated by governments to ensure that IT devices can coexist with RFID systems. Part 1 of the US FCC Part 15 mandates that a certified wireless device may not cause harmful interference. Moreover, most IT equipment is enclosed in a metal casing that is RF-opaque to UHF transmissions at 433 MHz. RF Code tag transmissions do not penetrate the metal casings of typical IT equipment.

RF Code systems do not have any negative effect on IT equipment in a data center or in similar environments like telecommunications centers. Over two million RF Code tags have been deployed in the past decade, with more than 500,000 tags mounted directly on IT servers. There has never been a report of data loss or degradation in any storage or security device due to the presence and/or operation of RF Code tags and readers.

Comparison of Active RFID Tag and Cell Phone Signals

From the IBM white paper: Using RFID Technology within close proximity of IT systems and equipment (2006).

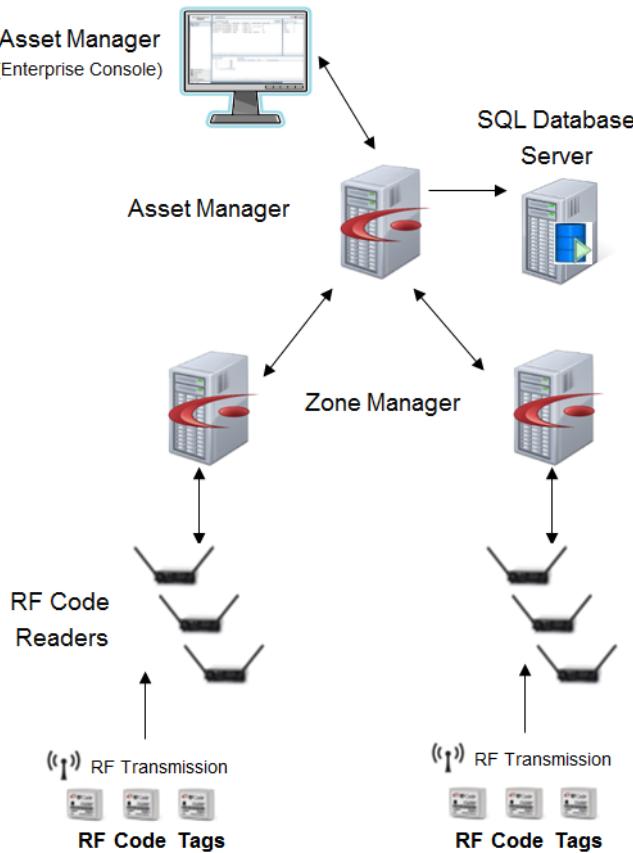
“Some cellular telephones typically operate in the same frequency range for UHF RFID and with an emission power of about 200-600 milliwatts and more... Cell phones are commonly used near, beside, or even within (3G/GPRS cards) IT equipment... Thus far, no harmful RF interference from these uses has been reported.”

The maximum radiated emission from an RF tag operating at 433 MHz is less than 0.0028 milliwatts.

To put RF Code tag power emissions in perspective, consider that cellular telephones operate with emission power levels that are 70,000 to 210,000 times greater than those emitted by RF Code active RFID tags. { $200 \text{ mW} \div 0.0028 \text{ mW} = 71,429$ }

RF Code Software and Hardware Overview

Asset Manager provides a comprehensive asset management and environmental monitoring system that provides a front-end user interface to configure and monitor RF Code active RFID tag and reader solutions, which are deployed across a wide variety of business infrastructures. The end-to-end system builds up from the hardware layer of tags, which send message beacons to RFID readers, which relay the information to Zone Manager, the RF Code middleware application, which then passes the information on to the top-level server, which is then accessed by end-users through a web interface launched in a standard web browser.



While potentially complex, the basic system is easy to use and maintain after the hardware has been deployed and Asset Manager has been initially configured.

RF Code Readers

RF Code readers do not use high-powered radio or magnetic fields to energize or trigger the RFID tags. RF Code readers are passive, incidental emitters with dual-channel radio receivers that are tuned to receive signals at 433.92 MHz. A digital signal processor is used to monitor the radio messages received from the tags.

RF Code RFID Tags

RF Code systems operate at 433.92 MHz; the tags are one-way, transmit-only communicators. RF Code holds numerous FCC grants for transmitters (tags). RFC's patented communication protocols were designed to provide reasonable protection against harmful interference. Tags typically broadcast their status every 10 seconds, but because each message is so short, each tag has an actual transmission time of less than 10 seconds per day.

RF Code IR Locators

An IR Locator is an identity beacon that transmits a unique user-defined code. IR-enabled tags receiving this beacon provide that information to Asset Manager, thus signaling the tagged asset's proximity to the locator. Rack, Room, and Proximity Locators are commonly used.

RF Code Active RFID Tags

RFC systems operate at 433.92 MHz; the tags are one-way, transmit-only communicators. RFC holds numerous FCC grants for transmitters (tags). RFC's patented communication protocols were designed to provide reasonable protection against harmful interference. Tags typically broadcast their status every 10 seconds, but because each message is so short, each tag has an actual transmission time of less than 10 seconds per day.

- Tags operate with a very low duty cycle and long battery life (typically 5 years with a 10-second beacon rate).
- To conserve battery power, tags remain in sleep mode 99.99% of the time; every 10 seconds, the tag will wake up and broadcast an extremely short status message before going back to sleep.
- Each tag's RF message includes its unique ID number and a short status indication (for example, normal, location, sensor status and/or low battery condition).

xxx-yyy	DRAFT 6	7/2/2015
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- The RF message is a sequence of up to 40 short pulses, where each pulse lasts only ~27 micro-seconds. Over a 24-hour period, a 10-second beacon tag will broadcast its status message 8,640 times.
- 8,640 messages equals approximately 346,000 individual pulses per day. Therefore, total transmission “on” time equals: 27 micro-seconds x 346,000 = 9.34 seconds per day.

Prerequisite Reader Configuration

In order to use Asset Manager, you will need to have at least one RF Code reader configured and one or more RF Code Active RFID tags within range of the reader. To configure a reader using the Reader Configuration Utility (RCU), refer to the [Reader Configuration with the Reader Configuration Utility](#) section in the Appendix. Additionally, you can test reader reception of tag beacons using the reader web interface; this process is described in the [Reader Configuration with Reader Web Interface](#) section in the Appendix. Later, after installing Asset Manager, you will add one or more readers and one or more Tag Group Codes within Asset Manager.

RF Code Zone Manager

Zone Manager is a real-time location engine designed specifically for use with RF Code’s asset management and wire-free environmental monitoring solutions. Zone Manager handles all of the direct hardware interfaces for RF Code readers and tags. Zone Manager is essentially the engine under the hood of Asset Manager and was designed for easy integration with one or more business applications via its open application programming interface (API).

xxx-yyy	DRAFT 7	7/2/2015
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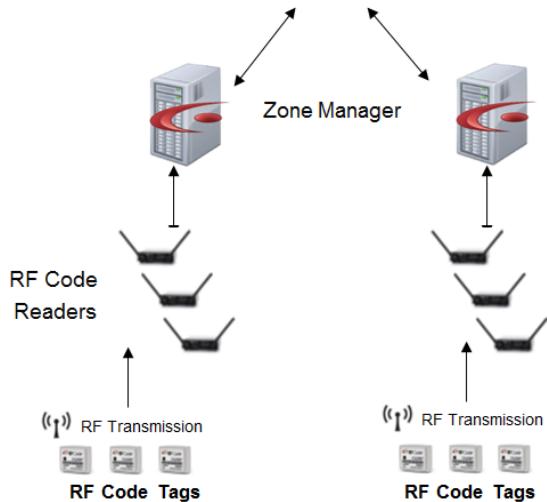
HP Asset Center/Connect IT

IBM Maximo

BMC Remedy

Other

3rd Party Platforms
Using Open APIs



Integration with the RF Code middleware / location engine known as Zone Manager involves utilizing the communications interfaces defined in the Zone Manager API Specification document: <http://support.rfcode.com/customer/portal/articles/716011>

The Zone Manager interface is extremely flexible and powerful. It can be utilized in almost any development environment due to the following characteristics of the Zone Manager API Specification:

- Telnet or web API-based communications
- Platform (operating system and hardware) independent
- Programming language independent

The Zone Manager software provides a great deal of value and functionality that can be easily leveraged such as:

- Reader communications channel management (for up to thousands of readers)
- Reader initialization, modes, and configuration
- Data buffering, filtering and interpretation
- Reduction of duplicate data from multiple readers

The Zone Manager middleware/location engine is not an end-user application, but was designed instead to be used in conjunction with an end-user application that can benefit from consuming the data and information produced by the Zone Manager system. It is important to note that the Zone Manager system is not designed to be a database of historical values or provide tag to asset association. Zone Manager is designed to collect and track (in real-time) the last known (latest) information about tag location, status and sensor readings. Since Zone Manager does not log historical data in a database, it is extremely scalable with the ability to service thousands of RF Code readers while operating on a single dual core server system. However, Asset Manager stores data in a database and enables historical records of reader, tag, and asset data.

The Zone Manager middleware/location engine allows for communication via a web or URL style API as well as a telnet style TCP/IP connection. The communications can be interactive (command / response) as well as registration or subscription based to follow updates or changes. The Zone Manager specification provides an extensive list of commands to fully control the RF Code readers and Zone Manager such as:

- Defining tag groups (which tags to listen for)
- Adding readers to the system as well as defining reader configuration parameters
- Location and rule configuration
- Tag and reader online/offline notifications
- Query capabilities such as which tags are in a specific location
- Multiple data output formats such as JSON, CSV, and XML

Integration with RF Code's Zone Manager does not require RFID specific or RF Code hardware skills. It does require a fair amount of standard software programming skills to configure programmatically the system and utilize the data returned by the system. Ideally integration with Zone

xxx-yyy	DRAFT 9	7/2/2015
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Manager would tie the system into an existing asset management or monitoring solution. RF Code highly recommends attending a training class to learn the details of the RF Code Zone Manager system. Contact RF Code support for information on training classes.

Zone Manager is bundled with Asset Manager and accommodates a single Zone for reader and tag environment coverage. However, Zone Manager can be installed on one or more separate servers. The system requirements for Zone Manager installations when installed apart from the Asset Manager installation are less stringent, as the Zone Manager application requires a smaller footprint and less computing resources to function. For alternate or expanded configurations, please refer to the Zone Manager User Guide and consult with RF Code Support for optimal deployment conditions and configuration.

Licensing Overview

Asset Licenses

Asset Manager is licensed based on the number of assets configured in the system. When an asset is added to Asset Manager it immediately and automatically consumes a license. The asset continues to consume a license until the asset is deleted. At that time, the license is immediately and automatically released. The types of assets defined are irrelevant as any asset counts and consumes a license. An asset can be an inventory type asset (with or without an asset tag associated with it), a sensor asset (sensor tag), or a summary asset. All the assets defined in the system consume licenses, regardless of the schema configuration. Every Inventory, Sensor and Summary Asset will each consume a license. However, no other configured object in the system consumes a license; the number of Locations, Users, Readers, etc. defined in the system has no bearing on the licensing.

For example, none of the following items consume licenses:

- Readers
- Zone Managers (local or remote)

xxx-yyy	DRAFT 10	7/2/2015
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- Users, Managers, or Administrators
- Locations or Rules
- Tag Groups or Unassigned tags
- Maps
- Dashboards

Assume an Asset Manager system contains all of the following:

- 50 readers
- 10 users
- 60 IT Racks spread across 6 rows in a single data center
- 75 unique locations defined in the Location Tree
- 2,500 inventory assets
- 350 sensors assets
- 67 summary assets (associated to the 60 IT Racks, 6 Rows, 1 Data Center locations)

Licenses are consumed only by the assets in the last three bullets: the 2,500 inventory assets, the 350 sensor assets, and the 67 summary assets. However, none of the readers, users, racks, or locations in the Location Tree consume a license; therefore, the total number of licenses required in this scenario would be 2,917.

NOTE: An asset is not the same as a tag. An asset can be created without a tag associated to it and this will still consume a license. Most often an asset does have an asset tag or sensor tag associated with it, but this is not always the case, especially with summary assets. Summary assets are assets that represent a location and an asset. Summary assets typically do not have asset tags associated to them, but like all other assets, they each consume a license. For more about summary assets, refer to the [Summary Asset](#) section.

Knowing how licenses are consumed is important when you calculate the number of licenses that you need to purchase.

xxx-yyy	DRAFT 11	7/2/2015
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Licenses for Advanced Features and Modules

Additional or premium features are licensed and can be unlocked or enabled by entering the appropriate license key. The following premium features are license-controlled:

- JMX and Tivoli Monitoring Integration
- BACnet Integration Module
- Modbus Integration Module
- ServerTech Sentry Power Manager (SPM) Integration
- Statistical Engine and Adaptive Thresholds

These premium features are licensed once and are then available regardless of the number of assets defined in the system.

NOTE: If you need more licenses, please contact your RF Code Sales representative.

Installing Asset Manager

In order to install Asset Manager, you must ensure that the application server (and the database server, if you are installing these components on different servers) meets minimum system requirements.

System Requirements

Asset Manager must be installed on a physical or virtual server. Once installed and configured, Asset Manager can be accessed over the network. While the Asset Manager server application does not

xxx-yyy	DRAFT 12	7/2/2015
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need a dedicated server, it is a common practice to dedicate a separate server for the Asset Manager database.

Network IP Address/Connectivity

- Every reader you deploy needs its own IP address.
- Asset Manager needs to be able to reach readers on the appropriate port (default port 6500) and readers need to be able to reach the Asset Manager server.

Hardware, Operating System, and Networking Requirements

The following are hardware, OS, and networking requirements for installing Asset Manager:

Operating Systems Supported

- 64-bit Windows 7
- 64-bit Windows 2008 Server
- 64-bit Windows 2012 Server
- 64-bit Red Hat Enterprise Linux (RHEL) 5.5 – 6.4
- 64-bit CentOS Linux 5.5 – 6.6
- 64-bit Oracle Linux 5.5 – 6.5

Databases Supported

- PostgreSQL version 8.3 and above
- Microsoft SQL Server 2008 and SQL Server 2012

Database Requirements

In addition to the Asset Manager server, a database is required for storing sensor tag data and configuration data that is gathered and managed by Asset Manager. Asset Manager is designed to work with Microsoft SQL Server or [PostgreSQL](#). If you have an existing database environment, create a new database and then connect it to Asset Manager. If you don't have a database environment

xxx-yyy	DRAFT 13	7/2/2015
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prepared or available, or you want the quickest way to dive into your pilot installation, you can use Microsoft SQL Express 2008, which is bundled with Asset Manager. However, this “lite” database is not recommended for long-term or production use; therefore, if you do install Asset Manager with SQL Express, then you will need to migrate to a production-quality database during the full roll-out by following standard database backup and restore procedures or by using the Asset Manager export and import functions. For more information about exporting Asset Manager configuration settings, refer to the Administrator’s Guide online.

Before installing Asset Manager, record the following database details:

- Database host name/IP address
- Port Number (for example 1433 for SQL)
- Database name
- Credentials to authenticate with the database (read/write/create access)

Hardware Requirements Table

The following table provides the minimum hardware specifications required to run Asset Manager depending on the number of tags you will deploy in your production environment.

Number of Tags in Deployment Environment	CPU Cores in the Application Server	RAM installed in the Application Server
< 1,000	2	2GB
< 10,000	2	3GB
< 20,000	4	4GB
< 30,000	4	5GB

NOTE: The storage space required to host your data can be calculated with the assistance of the RF Code Storage Capacity Calculator. For more information, refer to the RF Code Storage Space Calculator available online:

support.rfcode.com/customer/portal/articles/760679

Web Browsers Supported (Client Support)

- Microsoft Internet Explorer 10 & 11
- Mozilla Firefox 36 & 37
- Google Chrome 41 & 42
- Apple Safari 8

Asset Manager can be installed using Linux or Windows.

Windows Installation Overview

1. Create a Microsoft SQL Server or PostgreSQL [database](#) and user account with full access (unless installing pilot, in which case you can use the bundled Microsoft SQL Server Express).
2. Run install EXE from download or CD.
3. In Select Components window, choose **Install with database** (unless installing pilot, in which case Install with Microsoft SQL Server Express).
4. When web interface opens, log in with default account and password to configure Asset Manager.

Detailed instructions for installing Asset Manager in Windows are presented [below](#).

Linux Installation Overview

1. Create a PostgreSQL database and user account with full access.
2. Log in to Linux as root.
3. Download the RPM.
4. Install the Asset Manager package: `rpm -i rfcode-Asset Manager-{version}.x86_64.rpm`
5. Open ports in the firewall: `iptables -I INPUT -p tcp --dport {Port #} -j ACCEPT`

Detailed instructions for installing Asset Manager in Linux are presented [below](#).

xxx-yyy	DRAFT 15	7/2/2015
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Install Asset Manager in Windows

1. Run the installer's executable file from the RF Code Asset Manager from the Asset Manager file that you downloaded from the link provided by RF Code Support or the provided CD.
2. When the Asset Manager Setup Wizard starts, click **Next** to continue.
3. Read the License Agreement, select the radio button next to **I accept the agreement**, and then click **Next**.
4. Accept the default location for the installation folders and files or choose an alternate path that you would prefer.

NOTE: If you choose an installation path other than the default, be sure to record this information, which will be required to backup and restore data, and for server migration, and may be helpful should you ever need to contact RF Code Support.

5. Click **Next** and in the Select Components window, use the drop-down menu and choose the installation option you prefer.

NOTE: In most cases, choose the first option in the drop-down menu that installs both Asset Manager and Zone Manager. Install only the Zone Manager component to add additional Zone Managers, if required, after you have installed Asset Manager on a server.

6. On the next window, click **Install**.
7. Select **Install with Database**, or, for a pilot deployment, click **OK** to install the default database, Microsoft SQL Server Express edition, which is bundled with the Asset Manager installation package.

NOTE: Choose to Install with Microsoft SQL Server Express option **only** if you are installing Asset Manager as a pilot installation. SQL Server Express is not supported as a full production database for reasons such as scalability, configuration options, and

xxx-yyy	DRAFT 16	7/2/2015
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performance. If you do choose to install the bundled version of SQL Server Express to use as a database initially, be prepared to use it only as a temporary store of data and as a proof of concept. You will want to start from scratch when you install Asset Manager with a fully functional database when you deploy to a production environment.

NOTE: If installing SQL Server Express, you must accept all defaults. Do not change the default Administrator (sa) password, default installation directories, or default database engine settings. Doing so will prevent Asset Manager from being able to connect to the database for initial setup and initialization.

8. If installing for a production environment, click **OK** to install the selected database.
9. If installing pilot, accept the Microsoft SQL Server Express license agreement and then click **Next**.
10. Accept the default installation directories or specify desired directories.
11. Accept the default Named Instance, Instance ID, and Instance root directory, or specify desired Instance, and then click **Next**.
12. Accept the default database engine settings or set as desired and then click **Next**.
13. Configure the error reporting settings and then click **Next**.
14. Specify the service accounts.
15. Register your product to receive updates.

Ports Used by Asset Manager

Asset Manager uses the following ports by default. Ports may be changed, if desired, in the web interface.

Port	Use/Application
80	SPM integration
6580	HTTP Interface
6581	HTTPS Interface

Port	Use/Application
6503	Reader Up Connect Port
6502	Zone Manager Updates Port
502	Modbus Slave Port (if enabled)
8686	JMX Monitor Port (if enabled)
47808	BACnet Slave Port (if enabled)

Install with Microsoft SQL Server Professional

Asset Manager stores all data about assets, locations, history, and users in a database that is external to the server software.

NOTE: Supported databases for Asset Manager are Microsoft SQL Server 2008, Microsoft SQL Server 2012, and PostgreSQL 8.3 or later. Microsoft SQL Express 2008 is provided as a part of the installation package and installation wizard; however, it is intended only for use in labs and for limited pilots. Microsoft SQL Express does not include a Microsoft Management Console, is limited to 10GB of database size, and does not have the ability to perform scheduled backups.

NOTE: As of Asset Manager v2.8, Microsoft SQL Server 2008 and SQL Server 2012, as well as PostgreSQL 8.3 and DB2, are supported databases. Microsoft SQL Express 2008 is provided as a part of the Asset Manager installation package and installation wizard; however, it is intended for use in labs and for limited pilots. The Express version of SQL server is limited to 10GB of database size, and does not have the capability of performing scheduled backups. Also a Microsoft Management Console is not installed as part of the Asset Manager install.

When deploying in a production environment, use Microsoft SQL Server Standard (not Express), PostgreSQL, or DB2 so that you can perform essential database maintenance functions, such as backing up, restoring, re-indexing, and administering the data generated by Asset Manager.

To [configure either PostgreSQL or SQL Server for production use](#) with Asset Manager, a database must be created that is not populated with data and a user account must be created and given full access to the database. Do not use the “root” or “sa” accounts for security reasons. The database can be run on the same system that Asset Manager is installed on or it can be run on a remote machine and accessed by Asset Manager.

While knowledge of SQL statements and database schema are not required to administer Asset Manager, administrators must know how to create, secure, backup, restore and re-index the database software they choose to use.

Configure a Production Database

You can configure a production database following one of the two methods described below, depending on your needs.

Configure Microsoft SQL or PostgreSQL Server with Mixed Mode Authentication Turned On

1. In your Database Management Application, create a New Database and create or authorize a User with full access to the new database.
2. Install Asset Manager.

NOTE: Do not check the “Install SQL Express” box.

3. Click the Asset Manager icon after the installation is complete and then log in as **admin/admin**.
4. Select the database type.
5. Enter the correct **hostname, database name, user ID and password**.
6. Click **Test**.
7. Click **OK**.

xxx-yyy	DRAFT 19	7/2/2015
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NOTE: The Asset Manager service will restart. After 5-7 minutes, the database will be populated with the minimal amount of data and the Asset Manager system will be up and running.

Configure Microsoft SQL Server Using SQL Service Windows Authentication

1. In your Database Management Application, create a New Database in SQL server and from the DOMAIN accounts, select a user and grant that user access to the new database.
2. On a computer that is a member of the domain, install Asset Manager.

NOTE: Do *not* check the “Install SQL Express” box.

3. After Asset Manager is installed, shut down the Asset Manager service.
4. Then, under the “Log On” tab, change the “Log on as” entry from “Local System Account” to “This account” and select the domain user that was granted full rights on the new database.

5. Enter the user’s password and click **OK**.

The user will be granted login as a service rights.

6. Start the service and log in as **admin/admin**.
7. Enter the database type and hostname of the database server and check the **Use Windows Authentication** box.

NOTE: Do not enter a username or password.

8. Test the connection and make sure that it passes.
9. Click **OK**.

The software will reboot and after 5-7 minutes, the database will be populated and the software will be back online. To check this, go to the Asset Manager web interface and login.

xxx-yyy	DRAFT 20	7/2/2015
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Asset Manager Directory Structure and Files Present after Windows Installation

After installing Asset Manager, the directory structure in Windows will look like the following:

Name	Date modified	Type	Size
conf	3/22/2013 11:34 AM	File folder	
jetty	3/22/2013 11:34 AM	File folder	
jre-win64	3/22/2013 11:34 AM	File folder	
lib	3/22/2013 11:34 AM	File folder	
mib	3/22/2013 11:34 AM	File folder	
yajsw	3/22/2013 11:34 AM	File folder	
zonemgr.datadir	3/22/2013 11:34 AM	File folder	
application.ico	3/20/2013 9:20 AM	Icon	32 KB
launch	3/20/2013 9:20 AM	Internet Shortcut	1 KB
registration	3/20/2013 9:20 AM	Internet Shortcut	1 KB
unins000.dat	3/22/2013 11:34 AM	DAT File	105 KB
unins000.exe	3/22/2013 11:34 AM	Application	725 KB

The folders of particular interest are the following:

- conf: contains the system.properties file
- jetty: contains log files that are often useful for troubleshooting
- zonemgr.datadir: contains the Zone Manager database and files when it is installed with Asset Manager

The System Properties File

The system.properties file contains configuration directives for the software that may not be set inside the database or may be needed in order to connect to the database when the service is started. Changes made to this file are preserved when Asset Manager is upgraded. The file is modified whenever database connection parameters are changed within the Asset Manager software. Additionally, directives can be modified and added by hand that will change the behavior of the software.

NOTE: Save a copy of the system.properties file to an external location before editing. Except as instructed, do not edit the system.properties file without first contacting RF Code Support.

RF Code recommends including the system.properties file in the regular backup regimen of the system. All other unique information for Asset Manager other than what is contained in this file is stored in the database. The system.properties file and the database backup comprise the required pieces to restore the system.

Install Asset Manager in Linux

Files Required

The Asset Manager install for the supported Linux platforms consists of two RPM files that are only compatible with 64-bit distributions of Linux.

These rpm files are:

- **rfcode-am-zonemanager-{version}.x86_64.rpm**
- **rfcode-assetmanager-{version}.x86_64.rpm**

The Zone Manager RPM contains the Zone Manager component and may be installed on systems that will only run a Zone Manager instance. The Asset Manager RPM will install the Asset Manager software and an embedded version of Zone Manager reserved only for Asset Manager. Both RPMs may not be installed on the same system at the same time.

Linux Installation Notes

Both RPM installers will install their respective rfcode applications in /usr/share/rfcode. RF Code recommends 5GB of disk space be available for /usr/share/rfcode for most installations unless either the Zone Manager “event caching” feature or the Zone Manager “tag event logging” feature will be used. In these cases, additional storage will be needed on a case by case basis depending on the application desired. All logging, system configuration and temporary files will reside in /usr/share/rfcode. Logs are automatically rotated and there is no unbounded growth of the file system.

Installation of the Zone Manager RPM will install one file outside of /usr/share/rfcode called /etc/init.d/rfcAsset Manager. This is the startup script for the service. By default the service will be

xxx-yyy	DRAFT 22	7/2/2015
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started upon RPM install and when the operating system is at init 3, init 4 and init 5 and also features a clean shutdown script on init 0, init 1, init 6 and init 2. The rpm file will also add an unprivileged user and group called rfcode that will be used as credentials to run the service. This account will not be interactive and its shell will be set to /sbin/nologin for security purposes. Root or sudo access is only needed in order to install or upgrade the RPM, as is typical of RPM-based installs; this level of access is not necessary for day to day operation. No Asset Manager process will ever run as root.

Installing in a different directory

If /usr/share/rfcode is not an acceptable location, then create a symbolic link for /usr/share/rfcode that links to the directory (location) that you prefer. For example, to install the software in /opt/rfcode, first create the /opt/rfcode directory and type the following: *ln -s /opt/rfcode /usr/share/rfcode*

When the RPM is installed, the files will physically reside at the alternate location you prefer. It is possible to move the files and modify the startup script manually, but you will encounter issues when you upgrade Asset Manager because the installation is scripted to use the /usr/share/rfcode directory.

Executing under a Different Account

Neither the rfcode user nor the group that the Zone Manager rpm installs has a password or an interactive shell. The account is exclusively used to execute the application at a lower level of permission than the superuser account. If the execution account needs to be changed, this can be done by editing the startup script and modifying the execution user to be the preferred account. However, if you do this, you will also have to change the file system permissions to be owned by the appropriate user and group. If you must run Asset Manager on ports lower than 1024, then you will need to use a special procedure in order to run the application as a non-root user.

Executing the install

In order to install the software, use the rpm –i command and then supply the file name for the rpm to be installed. The install must be executed at a root privilege level either by being root or by using sudo.

xxx-yyy	DRAFT 23	7/2/2015
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rpm -i rfcodem-am-zonemanager-{version}.x86_64.rpm

OR

rpm -i rfcodem-assetmanager-{version}.x86_64.rpm

Service Notes

Once the service has been installed, it is managed through common operating system tools. When the system restarts there is no need to interactively start or stop the service manually. If however, starting or stopping the service is desired the following commands are useful.

```
service stop rfcassetmanager  
service start rfcassetmanager
```

Configuring Linux Firewall Settings

The following ports will need to be allowed through the firewall if their use is desired. The installer will not create these exceptions so if the operating system firewall is turned on this will need to be manually accomplished.

Port Number	Description	Notes
6580	HTTP interface	HTTP or HTTPS access is needed
6581	HTTPS interface	HTTP or HTTPS access is needed
6503	Reader Up Connect Port	Needed when using reader up connect feature
6502	ZM Updates Channel	Optional integration interface

To set up the Linux iptables firewall to allow these ports through, the following commands need to be issued with root privileges.

```
iptables -I INPUT -p tcp --dport 6580 -j ACCEPT  
iptables -I INPUT -p tcp --dport 6581 -j ACCEPT  
iptables -I INPUT -p tcp --dport 6503 -j ACCEPT  
iptables -I INPUT -p tcp --dport 6502 -j ACCEPT  
service iptables save
```

These commands will create the rules and save them so that they are persistent after rebooting.

Asset Manager Directory Structure and Files Present after Linux Installation

After installing Asset Manager in a Linux environment, the directory structure will look like the following:

Install with PostgreSQL

If you wish to install Asset Manager in a Windows or Linux environment using PostgreSQL for your database, you will need to install PostgreSQL and configure Asset Manager to point to it by using the settings under **Configuration > Database**.

For more information about PostgreSQL, refer to the third-party website:

<http://www.postgresql.org>.

Getting Started with Asset Manager

Asset Manager is a robust enterprise application that is easy to install and use almost immediately, but it has incredible flexibility to accommodate complex environments and enormous deployments of millions of tags and assets. However, as with any system that can be both simple and complicated to manage, Asset Manager requires a fundamental understanding of its structure and the possibilities therein, as well as knowledge of the quickest paths to determine what direction is right for your particular needs.

With any asset management system, the fundamental structure involves assets (objects or conditions of interest), the location of those assets, and the state of those assets. This summary encompasses

xxx-yyy	DRAFT 25	7/2/2015
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the need to keep data center computing equipment functioning optimally, expensive hospital equipment tracked and available for easiest use.

Typically, a system administrator installs and configures the application and database for a population of end users. Asset Manager is no different. This guide is written for an audience of administrators, as they need to know everything, and then some, about the application they are deploying and/or supporting. Within this guide are also the means by which end-users can access the information they need to ensure that their assets are functioning and functioning optimally.

Keep in mind that there are assets in the system and that these assets have attributes (characteristics with values). This distillation of objects and relationships accounts for physical objects that are managed through physical structures as well as the physical conditions of the environments in which the physical objects exist. Asset Manager provides a dynamic map of the territory for which you are responsible. This map will tell you where your assets are, how they are doing, and if they move, then you'll know that they did and you'll know where they went if they are still in your territory. If an asset does leave your territory, then you'll know where it was prior to departure.

Configuring Asset Manager

Five basic components must be configured in order to use Asset Manager: a database, a Zone Manager, a [Reader](#), [Tag Groups](#), and a basic [License Key](#). These are shown in the Dashboard under System Status in the System Configuration task pane. Until you configure each of the five basic System Configuration components, there will be a red  next to each. The red  will change to a green checkmark  after you complete the initial configuration for that component.

The Asset Manager Database and a local Zone Manager will already be configured if you chose the local Zone Manager option and provided database details (or, for a pilot deployment, chose the SQL Server Express option) during the installation process. These components will appear with green checkmarks next to them in the Configured column.

xxx-yyy	DRAFT 26	7/2/2015
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The screenshot shows the Asset Manager Administration interface. On the left is a navigation bar with 'Dashboard' selected. In the center, there's a 'Users Online' section showing one administrator logged in ('Administrator : (1 Logged In)'). On the right, there's a 'System Configuration' section with a table:

Component	Configure
Database Connection	✓
Zone Manager(s)	✓
Reader(s)	✗
Tag Group(s)	✗
License Key(s)	✗

Double-click a component name from System Configuration or click the Configuration task

Configuration to access a configuration task pane. Readers, Tag Groups, and License keys must be configured in the system before it can be used. There is no required order for these configuration tasks.

Asset Manager Web Interface

The Asset Manager web interface contains a navigation menu on the left with Tasks that you click in order to populate one or more panes of information on the right side. These panes either display information about various parts of the Asset Manager system or contain additional fields or functions.

This screenshot illustrates the Asset Manager Web Interface with several annotations:

- Bookmark Menu:** Located at the top right, it includes links for 'New', 'Edit', 'Settings', 'Copy', 'Delete', 'View', 'New Folder', 'Edit Folder', and 'Delete Folder'.
- Task/Navigation Menu:** A blue box highlights the left sidebar which lists tasks: 'Dashboard', 'System Status', 'System Status 2.3.3', 'Configuration', 'Integration', 'Locations / Rules / Maps', 'Data Schema', 'Security', 'Reports / Graphs', 'Events', and 'Alert Management'. The 'System Status' item is selected.
- Sub-Task Menu:** A blue box highlights the 'System Status' task, which displays a table of administrators logged in:

Administrators: (4 Logged In)	
admin	10.1.9.124
admin	10.1.9.131
admin	108.65.114.234
admin	10.1.26.100

- User Logged In:** A blue box highlights the bottom-left corner where it says 'Current User: admin'.
- Alert Notification Area:** A blue box highlights a warning message at the bottom: 'The reader PDU Demo Reader3 is offline.'
- System Configuration:** A blue box highlights the right-hand pane showing the same configuration table as the dashboard.
- Toggle Between User Console & Admin Console:** A blue box highlights the link 'User Console' at the bottom right.
- Readers Offline:** A blue box highlights a table showing readers that are offline:

Name	Hostname	Online Status	Reader State
PDU Demo Reader	192.168.0.66	No	CONNECTFAILURE
PDU Demo Reader4	192.168.0.66	No	CONNECTFAILURE
PDU Demo Reader2	192.168.0.66	No	CONNECTFAILURE
PDU Demo Reader3	192.168.0.66	No	CONNECTFAILURE

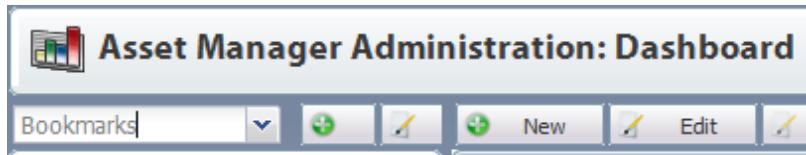
There are two primary consoles in Asset Manager, accessible by a **Console** link in the lower right corner of the interface. The name of the link changes depending on which console you are using, always displaying the name of the console to which it redirects.

- **Admin Console:** Access this console by clicking the **Admin Console** link in the lower right corner of the web interface of Asset Manager. This console is typically used for administrative functions of the server. This is where most of the initial configuration and system management is done. It is only visible to users assigned the system administrator role.
- **User Console:** Access this console by clicking the **User Console** link in the lower right corner of the web interface. This console is for managing and viewing assets, sensors, alerts, dashboards, reports, graphs, etc. This is where the daily use of Asset Manager is done.

Bookmarks

The **Bookmarks Menu**, at the top left of the web interface, offers the ability to **Add**, **Configure**, and quickly navigate to your bookmarks from a drop-down list.

At the top left of the web interface is the Bookmarks Menu, the Add Bookmark button (immediately to the right of the Bookmarks Menu), and the Configure Bookmarks button (immediately to the right of the Add Bookmark button).



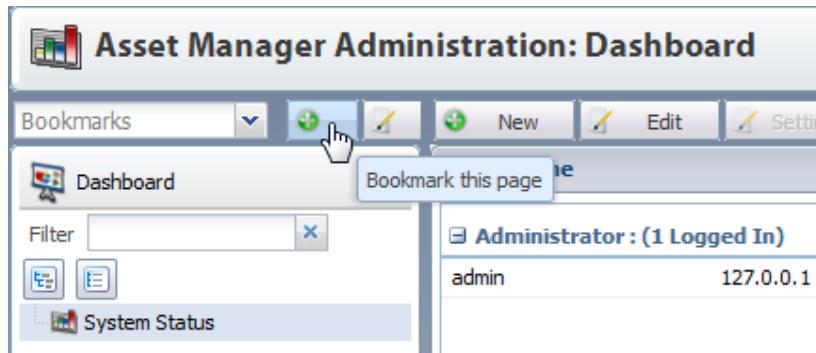
The **Bookmarks Menu** is a drop-down menu that lets you go quickly to any Bookmark you have added and configured.

The **Add Bookmark button** lets you add a new Bookmark of your current page location and view to the Bookmarks Menu.

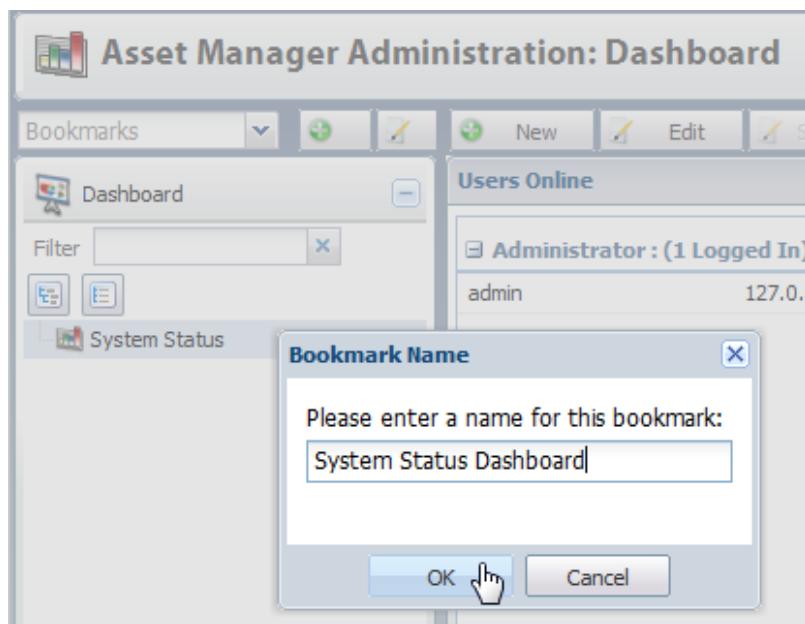
To add a new Bookmark, perform the following steps:

1. Click the Add Bookmarks button.

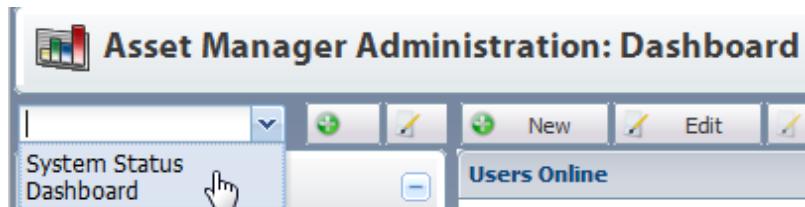
xxx-yyy	DRAFT 28	7/2/2015
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2. Give the Bookmark a **Name** and then click **OK**.



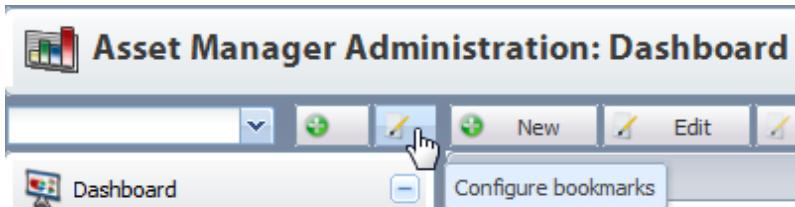
The new Bookmark appears as a choice in the Bookmarks Menu.



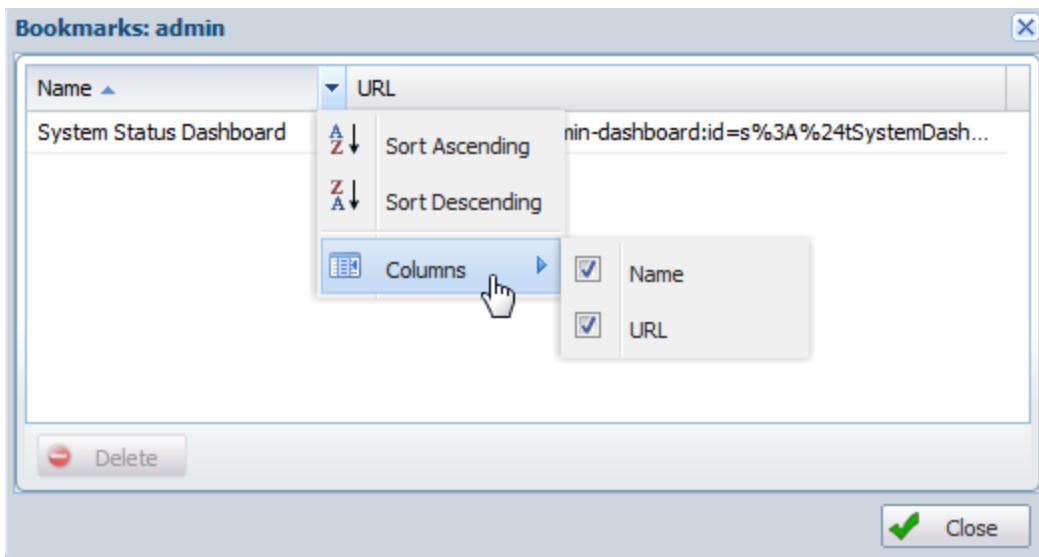
To configure your Bookmarks, perform the following steps:

1. Click the **Configure bookmarks** button.

xxx-yyy	DRAFT 29	7/2/2015
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The Bookmarks Menu configuration window appears.



Next to the column header for Name is the Bookmark configuration drop-down menu.

- To sort your Bookmarks alphabetically from A to Z, click **Sort Ascending**.
- To sort your Bookmarks from Z to A, click **Sort Descending**.
- To remove a Bookmark, highlight it and then click the **Delete** button.

Folders

The **New Folder** button is found the horizontal row of buttons to the right of the Bookmark Menu in most tasks including the Dashboard. It will not appear in those areas where it is not enabled.

The screenshot shows the Asset Manager Administration Dashboard. In the top right corner, there is a 'System Configuration' section with a table:

Component	Configured
Database Connection	✓
Zone Manager(s)	✓
Reader(s)	✓

Using Folders in Asset Manager is the same as it is in most graphical operating systems and provides a way to categorize and organize the items you create, which in the case of Asset Manager can be Reports, Graphs, Events, Alerts, Asset Templates, etc.

As a simple reference, an example of how to create and use a folder can be found in the [Asset Template](#) section of this document. Other examples of creating folders can be found in various other sections of this document.

The Administrator Console

The Administrator Console is used to manage the system infrastructure. It is used by an administrator to set up a system structure for the purpose of discovering, monitoring, and managing assets that have been tagged with RF Code Active RFID tags. The Administrator Console provides (or enables) the following tasks:

- **Dashboard:** to configure the primary views for end-users of the system
- **Configuration:** to configure the parts of the system necessary for viewing and storing tag data
- **Customization:** to create asset templates, views, skins and links for users
- **Integration:** to configure optional modules that integrate with third-party hardware and software
- **Location/Rules/Maps:** to configure the logical structure that represents your physical deployment of tags, readers, and IR locators
- **Data Schema:** to configure the types, assets, and sensors you will be using and the specific attributes of them that are important to you; however, for most deployments, this should not need to be modified. Consult with RF Code Support if you think you need to modify the default schema

- **Security:** to configure user accounts and access levels in the system
- **Reports/Graphs:** to configure the presentation of data that is reported from the system
- **Events:** to configure the types, parameters, and triggers of system-generated notifications when certain conditions occur so that administrators can manage the hardware and the software of the system
- **Alert Management:** much like Event configuration, Alert Management is used to configure the types and parameters of system-generated notifications when certain conditions occur so that end users can manage the state and status of assets and the environment that is being monitored

The Administrator Console is divided into two main regions, or panes. The left side is the navigation pane where the tasks and sub-tasks are located.

To the right of this is the task pane which contains several varying task panes depending on the main and sub-task selected. The administrator console also contains an information bar on the bottom of the screen, which contains two main features:

- **User Indicator:** shows the username (or admin) who is currently logged on and using the web interface session.
- **Bottom Navigation Links:** Logout, Link, About, User Console
 - Logout: Click Logout to end the current web interface session.
 - Link: Click Link to create a URL string that can be copied and pasted into an email or browser tab. Two Link options are provided, one that opens to the view in use, or a Single Page option that opens only the active pane and does not include the Task Pane.
 - About: Click About to show the version of Asset Manager.
 - User Console: Click User Console to switch to the User Console from the Admin Console. In the same place in the web interface, the link will read Admin Console if the user is logged into the User Console.

xxx-yyy	DRAFT 32	7/2/2015
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The User Console

The User Console lets Users manage assets and monitor environmental conditions, whether the Asset Manager system is deployed in a data center or elsewhere. The User Console Task Pane includes:

- Dashboard
- Tag Management
- Assets
- Customization
- Maps
- Reports/Graphs
- Events
- Alert Management

For screenshots and brief descriptions of all the Tasks and Sub-Tasks available in both the Admin Console and the User Console, refer to the [Admin Console and User Console Task Overview Matrix](#) section in the Appendix.

Adding Licenses

To enter a license key, perform the following steps:

1. Go to **Configuration > License Keys**.

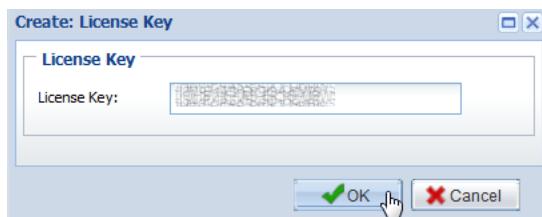
All license keys are displayed in this area after they are installed.

Asset Manager Administration: License Keys						
Bookmarks	Add License Key	Delete License Key				
Dashboard						
Configuration						
Database						
License Keys						
SMTP Server						
License Key						
	License Count	Expiration Date	License Key Type			
XXXXXXXX-XXXX-XXXX	100	Never	BACNET			
YYYY-YYYY-YYYY-YYYY	1	Never	BIRT			
ZZZZ-ZZZZ-ZZZZ-ZZZZ	1	Never	MODBUS			
TTTT-TTTT-TTTT-TTTT	1000	Never	ASSET			

2. Click the **Add License Key** button.



3. Enter the license key that your sales representative has provided to you.



4. Click the **OK** button.

The license key will then appear in the list with the license key parameters of License Count, Expiration Date, and License Key Type.



5. Go back to the **Dashboard > System Status** area.

You will see that the Configuration status for License Key(s) has changed to display a green checkmark.

Component	Configured
Database Connection	✓
Zone Manager(s)	✓
Reader(s)	✗
Tag Group(s)	✗
License Key(s)	✓

Adding and Configuring Readers

After you have configured one or more readers through the reader web interface or reader configuration utility (RCU), you then need to add your reader(s) to Asset Manager. For further details, refer to [Prerequisite Reader Configuration](#).

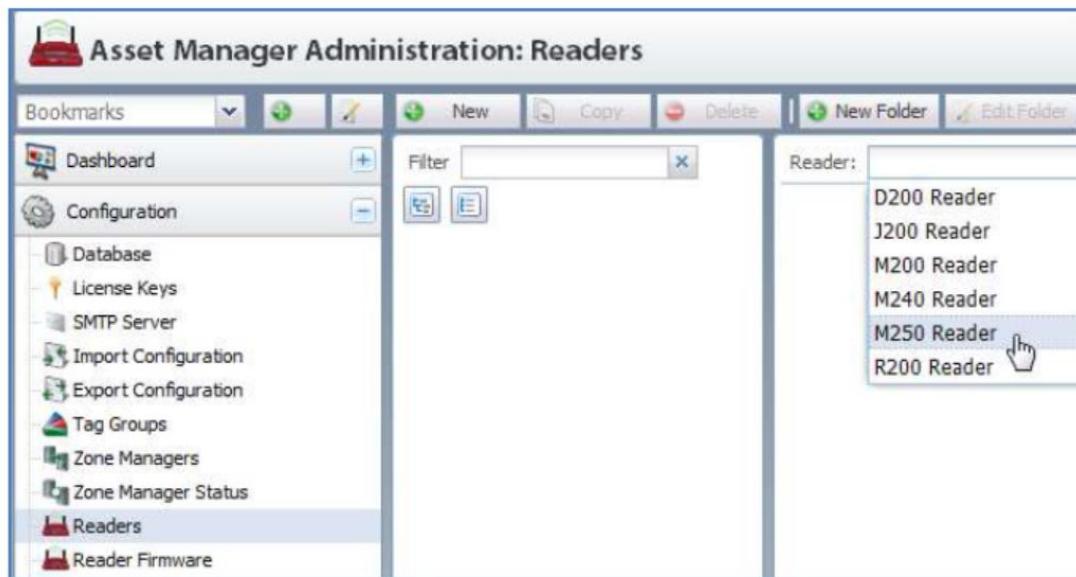
Before you have configured any readers in Asset Manager, the Admin Console Dashboard will show a red **✗** next to Reader(s) under System Configuration.

Component	Configured
Database Connection	✓
Zone Manager(s)	✓
Reader(s)	✗
Tag Group(s)	✓
License Key(s)	✗

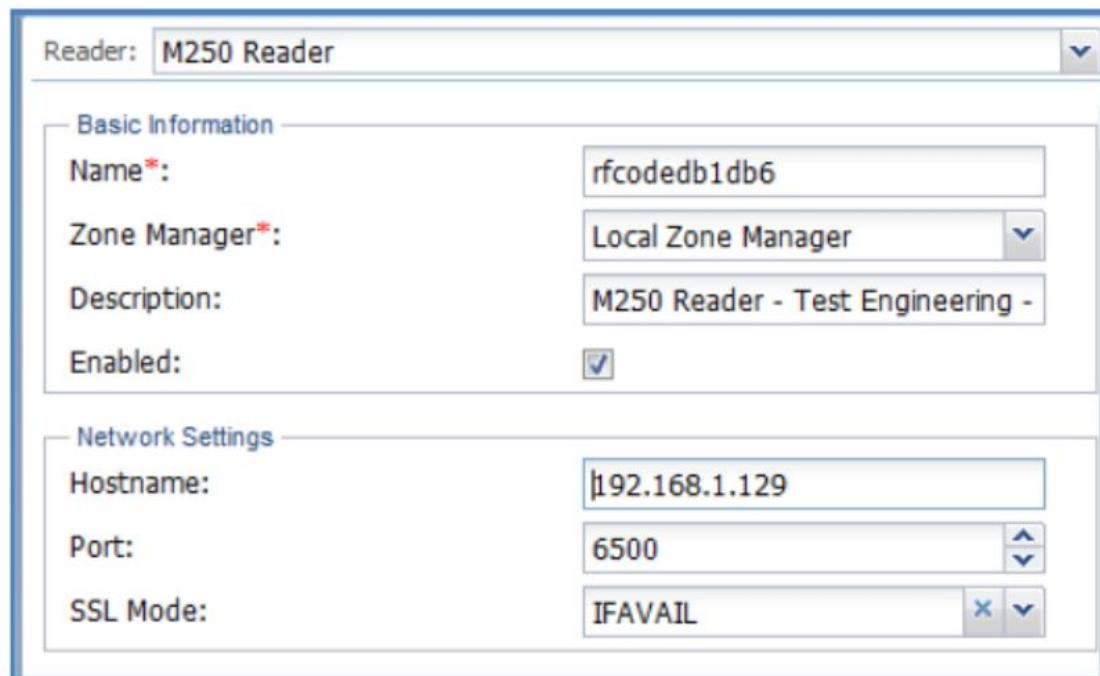
Reader Configuration in Asset Manager is done in the Reader Configuration task area. There you will see two task panes. In the center column is a tree of readers installed and configured in Asset Manager (which will be empty at first) and on the right is the task pane where reader configuration information is entered.

To configure a reader, perform the following steps:

1. In the **Admin Console**, navigate to **Configuration > Readers**.
2. In the Readers configuration screen, click the New button and select the reader type from the drop down list.



The Reader Configuration settings appears in the right pane.



The screenshot shows a software interface for configuring a reader. At the top, it says "Reader: M250 Reader". Below this, there are two main sections: "Basic Information" and "Network Settings".

Basic Information:

- Name***: rfcodedb1db6
- Zone Manager***: Local Zone Manager
- Description**: M250 Reader - Test Engineering -
- Enabled**: checked (indicated by a blue checkmark)

Network Settings:

- Hostname**: 192.168.1.129
- Port**: 6500
- SSL Mode**: IFAVAIL

3. Set the Basic and Network configuration settings for the reader:

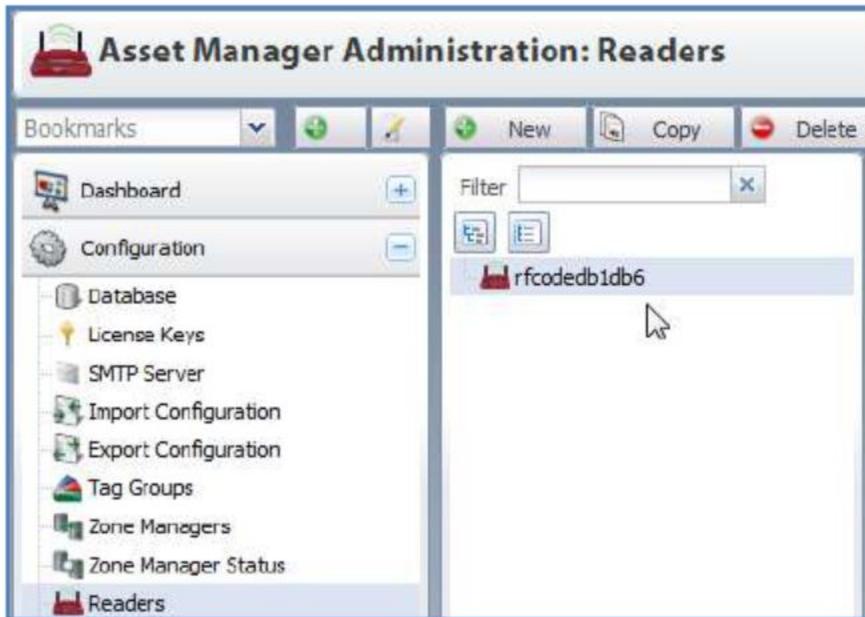
- **Reader:** Choose the type of reader you wish to configure from the drop-down list.
- **Name:** Create a name for the reader.
- **Zone Manager:** Choose the Zone Manager that you would like to assign your reader to (by default this is your local Zone Manager).
- **Description:** Enter a description for this Reader.
- **Enabled:** If you would like your reader to go active and receive and transmit tag data after saving your configuration, check this box.
- **Hostname:** Enter the IP address of your reader in this field.
- **Port:** Enter the port number over which to communicate with your reader (by default this is 6500).

- **SSL Mode:** Select OFF (to turn SSL mode off on the reader), IFAVAIL (uses SSL on the reader if available), REQUIRED (requires use of SSL) or STRICT (will authenticate the matching hostname, if the hostname does not match the reader will not connect).

NOTE: When getting started, you will want to accept most of the default entries. If you need to make changes in the future, refer to the [Advanced Reader Configuration](#) section in the Appendix. For example, if you will be using multiple Zone Managers, then you will not only have to add and configure the others later in Asset Manager, but you will also have to select (or change) the appropriate Zone Manager to which your reader will be associated. Initially, or if you will only be using a single Local Zone Manager, then leave the default option selected for **Local Zone Manager**.

NOTE: Additional reader configuration options are described in the [Advanced Reader Configuration](#) section in the Appendix.

4. Click the **Save Changes** button. The reader you have just configured appears in the middle pane to the left of the configuration pane.

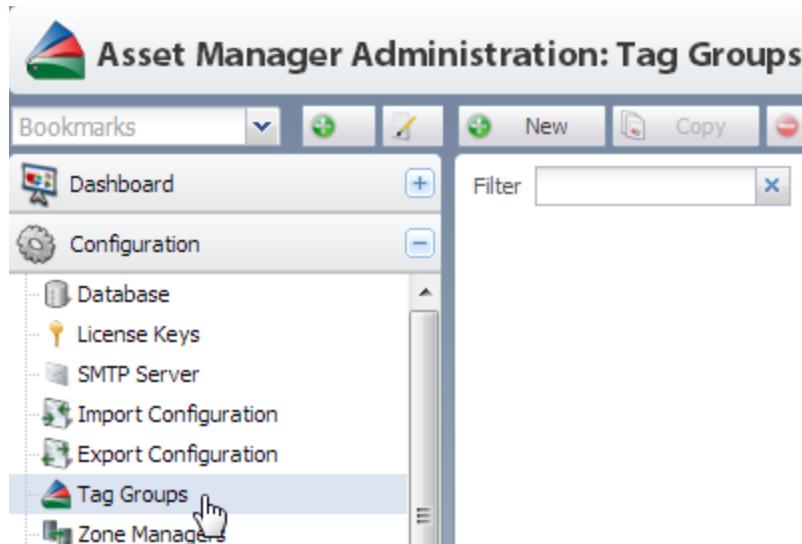


Adding Tag Groups

Tag Groups tell Asset Manager how to interpret beacons it receives. A Tag Group is made up of a three-character Treatment Code and a six-letter Group Code (both printed on the label of each tag). This combination signals Asset Manager to expect data from those types of tags defined by the Tag Group and how to treat the data it receives from them. Tag models that look and behave similarly are assigned the same Tag Group. Tag Groups must be configured for all the types of tags you have deployed, which can then be detected and associated to assets or, in the case of sensor tags, assigned to the locations where they will be monitoring environmental conditions.

Add a New Tag Group

1. In the Admin Console, navigate to **Configuration > Tag Groups**.



2. In the right pane, click the **Tag Group** drop-down menu and find the correct **Treatment Code** for the Tag Group that you want to add.

NOTE: The Treatment Code is printed on each tag on the bottom right corner of the label. When you enter a Treatment Code, the Group Code will pre-populate with a common Group Code; however, this may not match the Group Code on your tag. If it does not, enter the Group Code on your tag instead. Refer to the sections on [Tag Codes](#) in the Appendix and/or

xxx-yyy	DRAFT 39	7/2/2015
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to following RF Code Knowledge Base article for more information about Group Codes and Treatment Codes: support.rfcode.com/customer/portal/articles/723973.

The screenshot shows the Asset Manager Administration interface for managing Tag Groups. The top navigation bar includes 'Bookmarks' (with a dropdown arrow), 'New', 'Copy', and 'Delete' buttons. On the left, a sidebar lists 'Dashboard', 'Configuration' (with 'Database' and 'License Keys' sub-options), 'SMTP Server', 'Import Configuration', 'Export Configuration', and 'Tag Groups'. The main content area has a 'Filter' input field and two icons: 'HUMRCK' and 'THSRCK'. To the right, a list titled 'Tag Group:' displays several entries, with 'Treatment 04J Tag Group' highlighted by a mouse cursor.

Tag Group:
Treatment 04D Tag Group
Treatment 04E Tag Group
Treatment 04F Tag Group
Treatment 04H Tag Group
Treatment 04I Tag Group
Treatment 04J Tag Group
Treatment 04L Tag Group
Treatment 04M Tag Group

When a Treatment Code is clicked, the right pane fills with Tag Group configuration fields.

In the **Basic Information** section, the **Group Code** (for example, RFCRCK) will be pre-

xxx-yyy	DRAFT 40	7/2/2015
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populated.

NOTE: Each Tag Group can have multiple Group Codes, so you may need to specify a different Group Code. For more information, refer to the [RF Code Tag Group Codes, IDs, and Treatment Codes](#) section in the Appendix.

3. In the **Name** field, type the **Group Code** again, unless you need to name the Tag Group something different.
4. Click the **Save Changes** button at the bottom of the window.

Assets

Assets are the physical objects that are managed and/or monitored with Asset Manager, from inventory items such as blade servers and laptops to employees and visitors to environmental sensors.

Assets are classified in Types and have Attributes. Assets are assigned to Locations and Expected Locations, and Asset Manager can alert you whenever they are not in those assigned locations.

There is also a special class of Assets called Summary Assets that are explained in the [Summary Assets](#) section.

Managing Assets

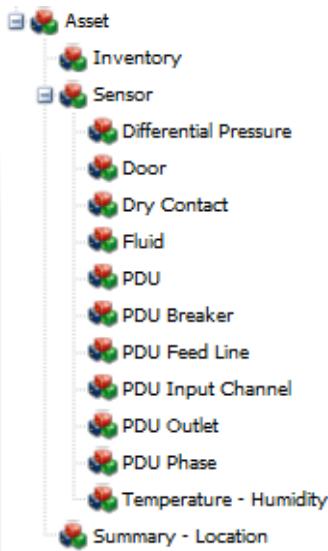
In order to efficiently and effectively manage your assets and monitor your environment within Asset Manager; you will need to plan and define a location hierarchy in which your assets exist. Before deploying Asset Manager in your production environment, you will need to have a good understanding of the logical Locations that are used in Asset Manager; however, you can use the pre-defined location hierarchy when you add the first few assets to the system while you are learning how to use it.

Locations are described in detail in the [Location and Location Hierarchy](#) section.

xxx-yyy	DRAFT 41	7/2/2015
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In addition to needing a properly structured Location Hierarchy, you will also want to extend the schema that is initially available within Asset Manager. The schema is the collection of Asset Types, Asset Attributes, Calculated Attributes, and Custom Attribute Types. Upon initial installation (that is, “out of the box”), Asset Manager has only a limited number of these available for you to use when adding assets to the system. However, there are two “stock” schemas available for immediate import and use in order to give you more pre-defined choices for categorizing and working with your assets and sensors. These two default asset schemas and all of the assets and asset attributes are discussed in detail in the [Default Asset Schemas](#) section in the Appendix.

Prior to importing one of the default asset schemas or creating any new Asset Types, the Asset Type Hierarchy will appear with limited choices; therefore, you will need to import a schema or manually create the specific Asset Types that you need for your production environment prior to adding new Assets. The base schema, immediately available after installing Asset Manager, contains no specific Inventory assets, such as Server, Storage Device, Laptop, etc. It contains three top-level categories (Inventory, Sensor, and/or Summary – Location) and eleven second-level or sub-type Asset Types that represent the standard types of RF Code sensors.



Adding Assets Individually

For Asset Manager to manage your assets, those assets must be added to the system. Assets may be added with or without tag assignments; however, it is recommended that you assign assets to tags during the initial creation of your asset record.

At least one asset must be added manually. After the first asset record is created, you can use the Export/Import feature and a spreadsheet program to upload records of assets and their associated attributes, or continue to input data by hand.

To add a new asset to Asset Manager, perform the following steps:

1. In **User Console** browse to **Tag Management > Manage Tags**.
2. Select the tag(s) under the **Import Detected Tags** column and click the **Add Selected Tag(s)** button, or click **Add All Tags**.
This will move the tags to the **Unassigned Tags column**.
3. In the **Unassigned Tags** column, right-click on the tag to be assigned in the far right column and then select **New Asset**.

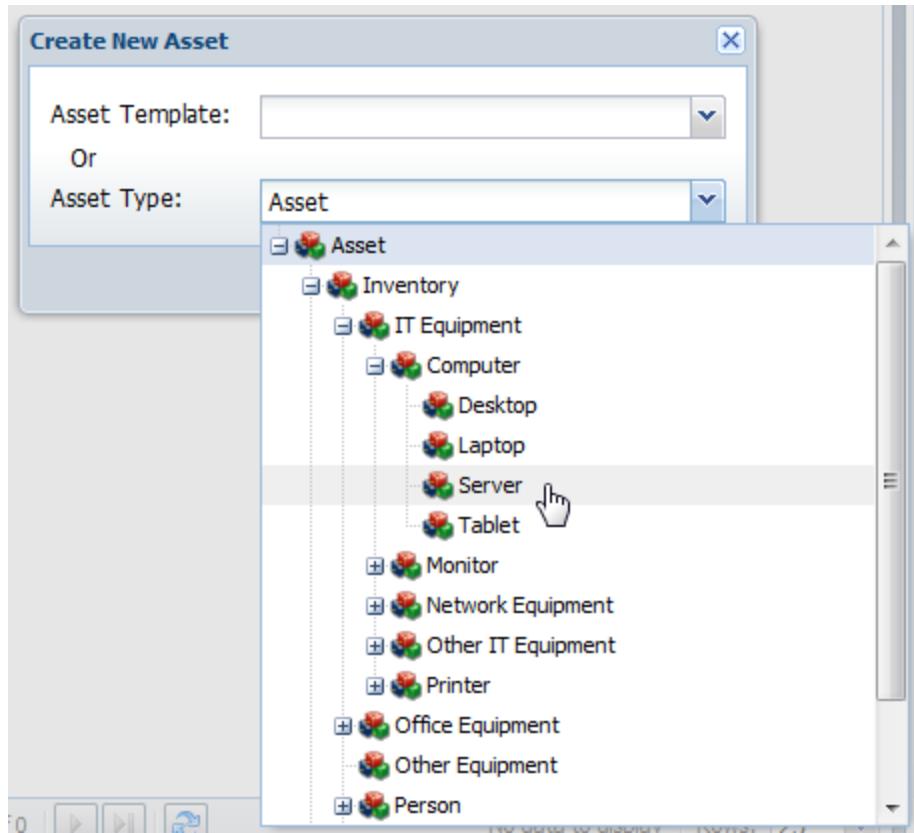
xxx-yyy	DRAFT 43	7/2/2015
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Unassigned Tags	
	Remove
	Remove All
Asset Tag	Service Date
TMPRCK00029639	2015-05-28
TMPRCK00029937	2015-05-28
New Asset	
Tag Details	
	Remove
	Remove All

4. Select the appropriate **Asset Type** to assign to the tag.

NOTE: In this example, a server asset is being added; therefore, **Server** is chosen as the **Asset Type**.

As mentioned previously, Server and the other Inventory Assets seen in the Location Hierarchy below are only available after they have been manually created or after one of the Default Schemas has been imported.



5. Configure at minimum the following asset fields:

- **Name:** This is a common description of the Asset and it must be unique. One common practice for naming sensors is to pre-pend a sensor tag type designator, for example, TempHum (or TH) to a description of that asset's physical and/or logical location, for example, AustinDataCenterRow1Rack1-Top, such that the name reflects both, for example, TH-AustinDataCenterRow1Rack1-Top.
- **Asset Tag:** Depending on how you navigated to this screen, this field may already be pre-populated. If it is not, start typing the unique ID of the tag and you will be able to select the specific Tag ID from the list that is presented to you dynamically.
- **Asset Location:** This field is used to tell Asset Manager where the tag will reside physically. Choose the appropriate location of the tag from the Location Hierarchy, for example, the specific rack where a temperature sensor asset is physically installed.
- **Lock Location:** Check this box if the asset is not a mobile asset, for example, an environmental sensor that should not be moved once it has been deployed.

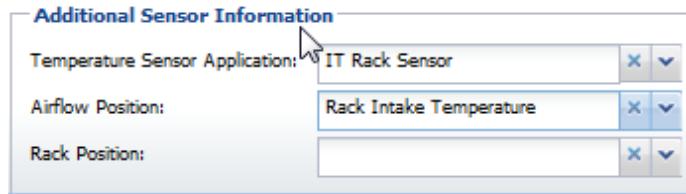
NOTE: The rest of the fields are optional, but when you are comfortable with Asset Manager, you can configure them to monitor a great deal about your assets and your environment.

The screenshot shows the 'Asset Manager: Manage Tags' interface. On the left, there's a sidebar with various navigation links like Dashboard, Tag Management, Customization, Assets, Access Control, Maps, Reports / Graphs, Events, and Alert Management. The main area has tabs for 'Import Tags' and 'Tag Groups: All'. A list of tag IDs is shown on the left, and a detailed 'Edit: Server' dialog box is open in the center. The dialog contains fields for Server Model (dropdown), Name (text input), Building Count (dropdown), PO Document (button), Retired (text input), LCS New (text input), Asset Tag (text input set to 'CLSRCK0000088'), Description (text input), Asset Location (dropdown), Previous Location (dropdown), Location Mode (dropdown), Expected Location(s) (dropdown), PO Number (text input), Purchase Terms (dropdown), Purchase Date (dropdown), Asset Age (months) (dropdown), and Purchase Value (\$). At the bottom are OK and Cancel buttons. To the right, there's a table titled 'Unassigned Tags' listing asset tags and service dates. The table includes columns for Asset Tag and Service Date, with several rows listed. At the bottom of the screen, there's a status bar with 'Profile: spolhemus', a low battery alert, and navigation links for 279 Open Alerts, Logout, Link, About, and Admin Console.

Environmental Monitoring with Sensor Tag Assets

Using RF Code sensor tags, you can monitor temperature, humidity, and other environmental conditions. When you configure Asset Manager to use sensor tags, you will be adding the sensors as Assets and designating a location for each one. For example, you can add a temperature sensor as an asset tied to a specific location in your data center. Additionally, with sensor tags, you can configure the following three additional fields:

- **Temperature Sensor Application:** This drop-down allows the software to designate how the sensor is deployed, for example, IT Cabinet/Rack.
- **Airflow Position:** This field specifies server placement on the front or back of the rack. Intake sensors go on the front of the rack.
- **Rack Position:** Designates the “Top”, “Middle”, or “Bottom” placement of the sensor on the front of the rack door.



Managing RCI and RTI with Temperature Sensors

When you use temperature and temperature/humidity tags, you can monitor RTI and RCI metrics in order to determine your level of compliance to ASHRAE standards. RF Code provides a complete deployment guide for environmental monitoring deployments intended to measure and manage RCI and RTI in data centers using RF Code readers and sensor tags. This document can be found on the RF Code Support web site here: <http://support.rfcode.com/customer/portal/articles/976954>

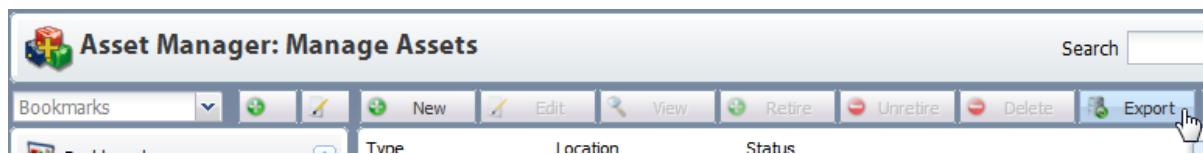
Creating an Asset Export File to Import Assets in Bulk

You can add large groups of assets through the Export/Import functions. First, you create an export template based on existing Inventory, Sensor, and/or Summary – Location Assets with their associated Attributes – the ones you entered manually – so that you can use the same structure and detail for them within Asset Manager. By using a template and an external spreadsheet you do not have to enter a large group of Assets manually, one at a time. This process also facilitates the use of a barcode scanner.

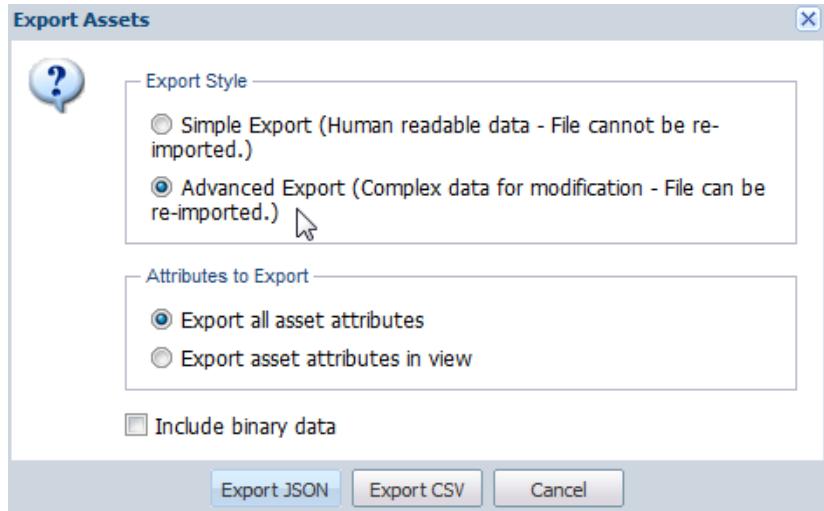
An exported Asset template, which is a CSV file, is used to populate Asset Manager with a large group of Assets and the tags associated with them.

To export a template, follow these instructions.

1. In the **User Console**, go to **Assets > Manage Assets**.
2. Click the **Export** button.



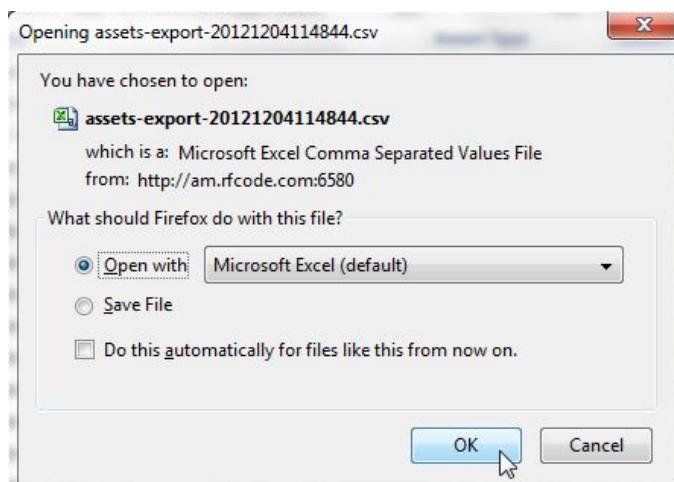
3. Under **Export Style**, select the **Advanced Export** radio button so the file is in format suitable for re-importing.



4. Select the radio button next to **Export all asset attributes** and then click **Export CSV**.

NOTE: If you have pictures or other non-text files associated with your assets, click to check the **Include binary data** box.

5. Save the File or open it with a spreadsheet program that reads CSV files, for example, Microsoft Excel (as seen in the screenshot below).



Configuring an Asset Export File to Populate and then Import

An Asset Export file is a comma-separated values (CSV) file that can be read by any spreadsheet program.

assets-export-20121204114844 [Read-Only] - Microsoft Excel															
File Home Insert Page Layout Formulas Data Review View															
Font Alignment Number Styles															
A1	f _x	class	A	B	C	D	E	F	G	H	I	J	K	L	M
1	class	type	guid	retired	deletable	RACK_POSITION	\$aAssetLo	\$aAssetTe	\$aAssetSe	INTAKE_TI	\$aName	TEMP_PR	\$aOnline	\$aAssetTag	
2	entity	TEMPERATURE	RACK_TEN	FALSE	TRUE	Top	FALSE	24.5			Rack 3 - RFIT_RACK_S	TRUE			
3	entity	TEMPERATURE	RACK_TEN	FALSE	TRUE	Middle	FALSE	24.2			Rack 3 - RFIT_RACK_S	TRUE			
4	entity	TEMPERATURE	RACK_TEN	FALSE	TRUE	Bottom	FALSE	24			Rack 3 - RFIT_RACK_S	TRUE			
5	entity	TEMPERATURE	RACK_TEN	FALSE	TRUE	Top	FALSE	24.4			Rack 3 - RFIT_RACK_S	TRUE			
6	entity	TEMPERATURE	RACK_TEN	FALSE	TRUE	Middle	FALSE	24.2			Rack 3 - RFIT_RACK_S	TRUE			

To configure the file in order to import Assets in bulk, perform the following steps:

1. Highlight all of the cells and then double-click the line between the first two columns to expand all the columns wide enough to read all of the cell values.

assets-export-20121204114844 [Read-Only] - Microsoft Excel									
File Home Insert Page Layout Formulas Data Review View									
Font Alignment Number Styles									
A1	f _x	class	B	C	D	E	F	G	H
1	class	type	guid		retired	deletable	RACK_POSITION	\$aAssetLowBattery	\$aAssetTemperature \$aAssetTag
2	entity	TEMPERATURE_HUMIDITY	RACK_TEMPERATURE_HUMIDITY_SENSOR_6da0f33dc7545b2		FALSE	TRUE	Top	FALSE	24.5
3	entity	TEMPERATURE_HUMIDITY	RACK_TEMPERATURE_HUMIDITY_SENSOR_99be2dd59b7c2862		FALSE	TRUE	Middle	FALSE	24.2
4	entity	TEMPERATURE_HUMIDITY	RACK_TEMPERATURE_HUMIDITY_SENSOR_a91c4092b656528f		FALSE	TRUE	Bottom	FALSE	24
5	entity	TEMPERATURE_HUMIDITY	RACK_TEMPERATURE_HUMIDITY_SENSOR_d6f652373f88f7ce		FALSE	TRUE	Top	FALSE	24.4
6	entity	TEMPERATURE_HUMIDITY	RACK_TEMPERATURE_HUMIDITY_SENSOR_b30e9f6a3a1dbebb		FALSE	TRUE	Middle	FALSE	24.2

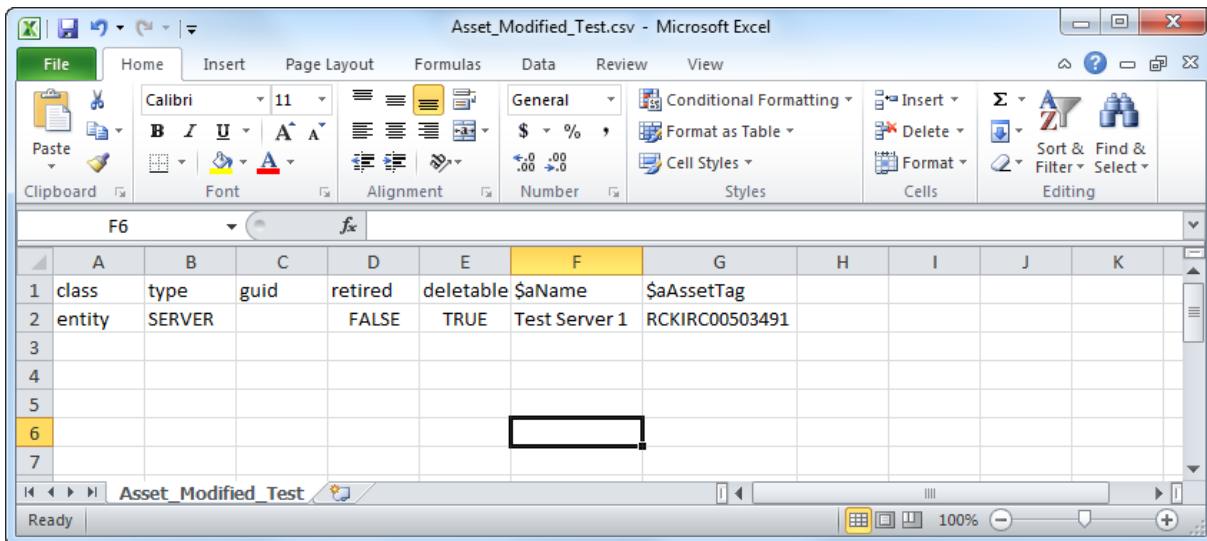
2. Remove all the columns other than Class, Type, guid, Retired, Deletable, \$aName, \$aAsset Tag:

Class	Type	guid	Retired	Deletable	\$aName	\$aAsset Tag
typically Entity.	Asset Type	leave this field empty.	For new assets,	This field	Assign a unique name	Enter the unique Tag

xxx-yyy	DRAFT 49	7/2/2015
---------	-------------	----------

Class	Type	guid	Retired	Deletable	\$aName	\$aAsset Tag
		Asset Manager will assign a guid on import.	False.	describes whether or not a user can delete this asset. Typically True.	for each asset.	ID for each tagged asset.

NOTE: The example below shows the fields required for importing new tags and attributes and presumes a blank template; that is, nothing has been exported in the screenshot below so the guid field is blank. However, all of the other attribute fields must have values or the import will present errors.



- Add your assets with attributes and tags to the spreadsheet.

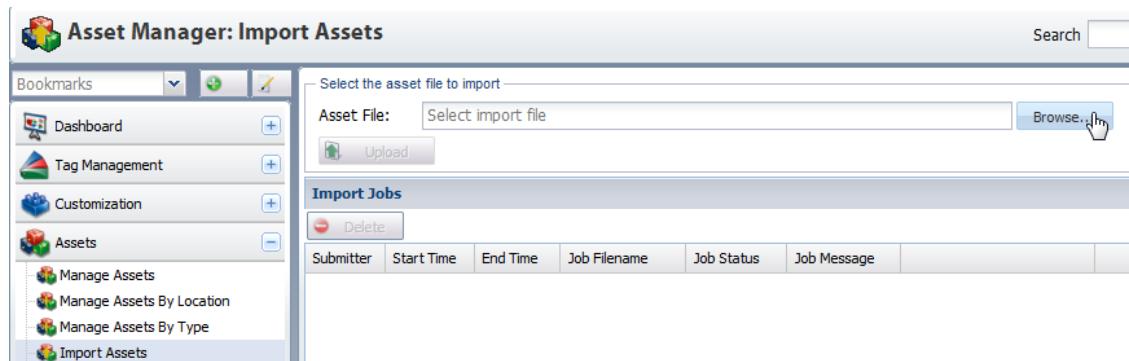
NOTE: You must leave the **guid** field blank (empty) when adding new tags and their attributes. The guid is a unique asset/sensor identifier that is automatically assigned by Asset Manager to each asset or sensor.

NOTE: The values you assign to both the **\$aName** and the **\$aAssetTag** attributes must be unique for each asset or sensor.

Importing Assets

To import assets, perform the following steps:

1. Under **Assets > Import Assets**, **Browse** to find the spreadsheet and then click the **Upload** button to import the new spreadsheet.



NOTE: If there are any errors in the import job, they will be presented in the Import Jobs pane, which is the same Import Jobs pane visible to Administrators for Schema Imports and Config Imports. Refer to the [Import Jobs](#) section in the Appendix for more information about the statuses, messages, and errors associated with imports.

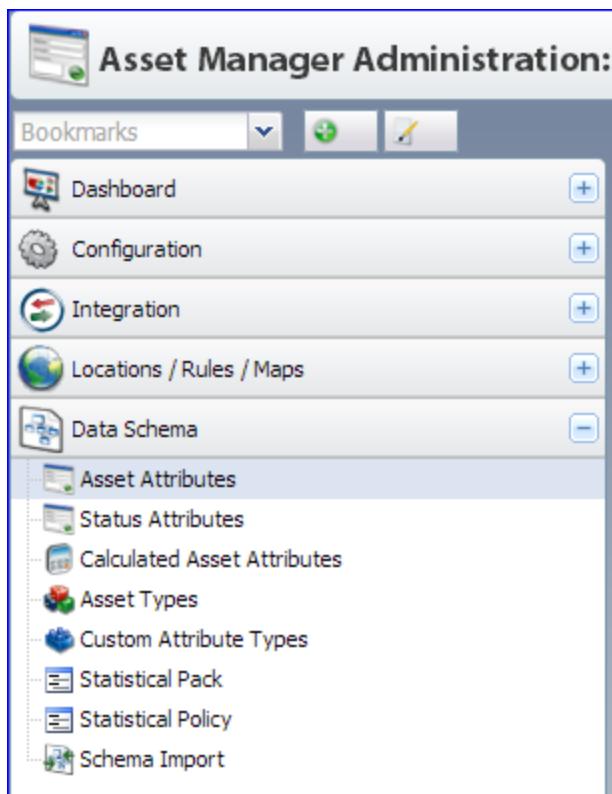
1. In the **User Console** navigate to **Assets > Manage Assets** to view the newly added assets.

Data Schema

The Data Schema task configuration area in the Admin Console lets you edit and/or add all of the following:

xxx-yyy	DRAFT 51	7/2/2015
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- Asset Attributes
- Status Attributes
- Calculated Asset Attributes
- Asset Types
- Custom Attribute Types
- Statistical Pack
- Statistical Policy
- Schema Import



NOTE: The Schema Import task lets you load a Default Asset Schema or a Custom Schema that has been pre-defined.

Asset attributes are defined fields which hold specific pieces of information about assets. Examples of asset attributes in a data schema would be:

- Asset Description
- Asset Tag ID
- Purchase Date
- Manufacturer

Status attributes are fields that indicate information about the state of assets.

- Temperature
- Low Battery
- Online Status
- Motion

Calculated asset attributes use formulas to derive values from data held by other attributes.

- Asset Count
- Average Humidity
- Total Offline Assets
- Oldest Assets

NOTE: Conditional Formatting for Asset Attributes, Status Attributes, and Calculated Attributes can be configured to change the foreground and/or background color of a cell in views and dashboards depending on the attribute value. For example, a numerical attribute can be configured so that the cell background turns red when its value exceeds 100. Multiple rules can be

xxx-yyy	DRAFT 53	7/2/2015
---------	-------------	----------

applied to formatting and the value of an attribute is evaluated against rules from the top down.

The first rule matched determines the formatting.

Asset Types define specific types of assets. Asset Types can be created hierarchically, allowing for more specific asset definition as you go further down the hierarchy. Here are examples of some

Asset Types:

- Laptop
- Server
- Copier
- Employee

Once an asset attribute is defined, it can be applied to one or more asset types to define the specific information to be collected about the asset. Typically an asset type will have multiple asset attributes associated with it.

A Custom Attribute type can be an individual value or a list of values that can be added to asset types. Custom attribute types can be implemented as either flat lists of values or as a hierarchy of values. There is no predefined way to use custom attribute types, but a good example of their use might be a company directory, where a hierarchy of divisions and departments could be created. Custom attribute types could then reference the department hierarchy to describe their position within an organization.

The Schema Import feature provides various pre-canned data schemas that are created by RF Code for some common types of asset organization. Administrators can choose to import one or all of the RF Code created schemas to quickly and easily start using the Asset Manager software.

xxx-yyy	DRAFT 54	7/2/2015
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Asset Types

An asset type defines a specific type of asset (such as an IT asset with a sub-type of a server, desktop, or laptop) that will be managed within Asset Manager. Asset Types are most typically arranged in a hierarchical tree that becomes more granular from top to bottom.

The Asset Types task is found in the **Admin Console** under **Data Schema > Asset Type** and provides the following functions:

- Viewing the Asset Types hierarchy
- Creating Asset Types
- Editing Asset Types
- Deleting Asset Types
- Associating Asset Attributes with Asset Types
- Configuration of Asset Type input form
- Viewing sample Asset Type input form

The default schema is usually sufficient for most deployments; however, it can also be customized.

Before beginning to customize your Asset Schema, plan for the following:

- Decide and document all of the different types of assets you wish to manage with Asset Manager.
- Create and document an Asset Type hierarchy from your list of types of assets.
- Determine and document the Attribute Types (information) you wish to collect about each type of asset.
- For each Attribute Type, determine the data type of the attribute (string, date, number, etc.).

xxx-yyy	DRAFT 55	7/2/2015
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- For each Attribute Type, determine where in the Asset Type hierarchy it should be applied, remembering that children of an Asset Type inherit Asset Attributes from their parents.

After planning, perform the following steps in the following order:

1. Use the Asset Type task to create all of your Asset Types organized in your desired hierarchy.
2. Use the Asset Attribute task to create all of your Asset Attributes.
3. Use the Asset Type task to associate the Asset Attributes with the appropriate Asset Types.
4. Validate that Asset Type input forms are correct by viewing the Sample Input Form for each Asset Type.

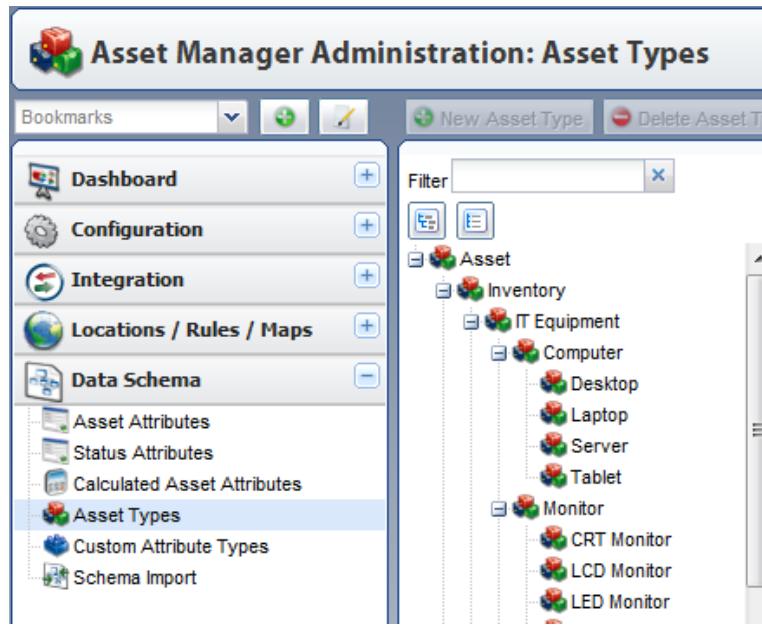
From the Asset Types task menu, you can perform all of the following primary functions:

- The **New Asset Type** button for creating new Asset Types.
- The **Delete Asset Type** button for deleting Asset Types.
- The **View Sample Input Form** button for viewing a sample of the Asset Type's input form.
- The **Expand All** icon button just beneath the "New Asset Type". This button expands the entire Asset Type hierarchy.
- The **Collapse All** icon button just beneath the "New Asset Type". This button collapses the entire Asset Type hierarchy.

Viewing Asset Types

1. In the **Admin Console**, navigate to **Data Schema > Asset Types**.

xxx-yyy	DRAFT 56	7/2/2015
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2. The Asset Editor area shows the details of the Asset Type and is divided into three areas:
 - **Name and Description:** This area shows the Name, Description, ID, and Parent of the selected Asset Type.
 - **Attributes:** This area shows the attributes that are associated to the Asset Type. There are controls for managing the Attribute Types that are associated to the Asset Type as well.
 - **Inherited Attributes:** This area shows all of the Asset Attributes that the Asset Type has inherited from its parents. Inherited Asset Attributes can only be viewed here. To manage an inherited Asset Attribute, you must edit the Asset Type with which it is associated.

Adding New Asset Types

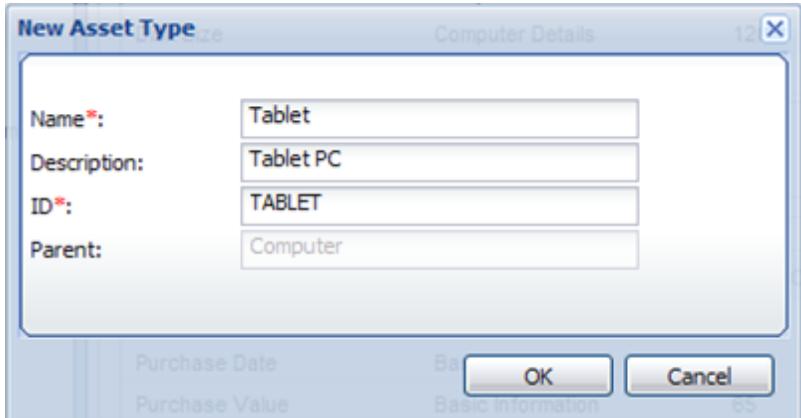
The following steps will guide you through creating a new Asset Type:

1. In the **Admin Console**, navigate to **Data Schema > Asset Type**.
2. Select a parent Asset Type from the Asset Type tree for the new Asset Type you wish to create.

NOTE: All Asset Types must have a parent. There can be as many Asset Type children in your hierarchy as you need.

3. Click the **New Asset Type** button.

The New Asset Type creation window appears.



4. Enter a **Name** and a **Description** for the new Asset Type.

The **ID** will be automatically generated from the Name you enter, but you can replace the ID if you want.

In the screenshot above, a new Asset Type named Tablet is being created as a child under the Parent Computer Asset Type.

5. Click the **OK** button to create the new Asset Type.

The new Asset Type Tablet is now displayed in the Asset Type hierarchy tree as a child of the Asset Type Computer.

NOTE: By default there are no Asset Attributes associated with the new “Tablet” Asset Type.

Edit Attributes: Tablet

Name and Description																									
Name*:	Tablet																								
Description:																									
ID:	TABLET																								
Parent:	Computer																								
Attributes																									
<table border="1"> <thead> <tr> <th>Name</th> <th>Category</th> <th>Field Order</th> <th>Required</th> <th>Static</th> <th>Defa...</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Name	Category	Field Order	Required	Static	Defa...																		
Name	Category	Field Order	Required	Static	Defa...																				
<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>																									
Inherited Attributes																									
<table border="1"> <thead> <tr> <th>Name</th> <th>Category</th> <th>Field Order</th> <th>Inherited From</th> </tr> </thead> <tbody> <tr> <td>Processor</td> <td>Computer Details</td> <td>1000</td> <td>Computer</td> </tr> <tr> <td>RAM Amount (GB)</td> <td>Computer Details</td> <td>1100</td> <td>Computer</td> </tr> <tr> <td>Storage or Disk Size (GB)</td> <td>Computer Details</td> <td>1200</td> <td>Computer</td> </tr> <tr> <td>Operating System</td> <td>Computer Details</td> <td>1300</td> <td>Computer</td> </tr> <tr> <td>MAC Address (xx:xx:xx:x...)</td> <td>Computer Details</td> <td>1400</td> <td>Computer</td> </tr> </tbody> </table>		Name	Category	Field Order	Inherited From	Processor	Computer Details	1000	Computer	RAM Amount (GB)	Computer Details	1100	Computer	Storage or Disk Size (GB)	Computer Details	1200	Computer	Operating System	Computer Details	1300	Computer	MAC Address (xx:xx:xx:x...)	Computer Details	1400	Computer
Name	Category	Field Order	Inherited From																						
Processor	Computer Details	1000	Computer																						
RAM Amount (GB)	Computer Details	1100	Computer																						
Storage or Disk Size (GB)	Computer Details	1200	Computer																						
Operating System	Computer Details	1300	Computer																						
MAC Address (xx:xx:xx:x...)	Computer Details	1400	Computer																						

NOTE: For more information, refer to the [Asset Attributes and Asset Types](#) section.

Viewing an Asset Type Sample Input Form

The purpose of the Sample Input Form is to display the entry form that users will see when they go to add an asset to the system within the User Console.

The following steps will guide you through viewing an Asset Type Sample Input Form:

1. Navigate in the **Admin Console to Data Schema > Asset Type**.
2. Click the button **View Sample Input Form**.

The Sample Input Form appears.

New Tablet

Tablet PC

Basic Information

(0) Name*:

(20) Asset Tag:

(30) Description:

(40) Asset Location:

(50) Purchase Terms:

(50) Expected Location(s):

(60) Purchase Date:

(65) Purchase Value:

(70) Manufacturer:

(80) Model:

Computer Details

(1000) Processor:

(1100) RAM Amount:

(1200) Disk Size:

(1300) Operating System:

The Sample Input Form above shows an example of the Asset Type entry window for the selected Asset Type. The numbers surrounded by parenthesis to the left of each field name is the Field Order assigned when each field was added to its respective asset type and is displayed here to help with managing the form layout. These numbers will not be displayed in the User Console when the input form is presented. You have full control over the organization of the fields on the form, which will be covered later in this document.

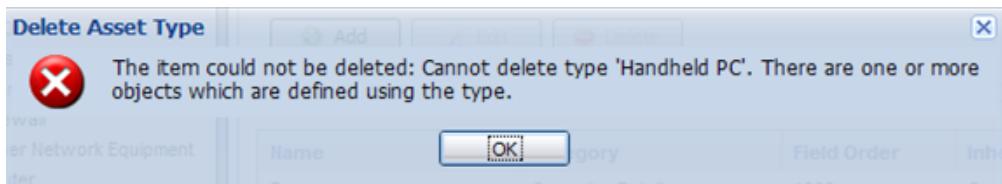
3. Click the **Close** button to close the Sample Input Form window.

Deleting Asset Types

To delete an Asset Type, perform the following steps:

1. Navigate in the **Admin Console** to **Data Schema > Asset Type**.
The Asset Type task pane appears on the right.
2. Select the Asset Type you wish to delete from the Asset Type hierarchy tree and then click the **Delete** button.

NOTE: You can only delete an Asset Type if it is not in use. If any assets of the selected type have been added to the system you will receive a notification that the Asset Type cannot be deleted, such as the error message below.



NOTE: If you receive the notification that an Asset Type is in use, you must first delete all of the assets of the specified type (via the User Console) before the Asset Type can be deleted. After you delete an Asset Type, it will be removed from the Asset Type hierarchy tree.

Asset Templates

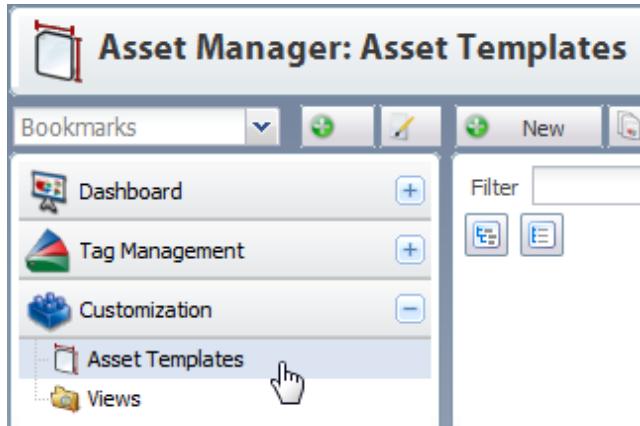
In the User Console, you can create templates to facilitate the addition of new assets. Asset templates are also well-suited to adding assets with use of a barcode scanner. The asset template can have one or more attributes already filled in with default data to avoid reentering repetitive data for multiple assets that are being added to the system. Views are used in the Dashboard and Assets Task to define which attributes are included in the view when displaying the asset list. The views will also determine column ordering of the attributes being displayed.

xxx-yyy	DRAFT 61	7/2/2015
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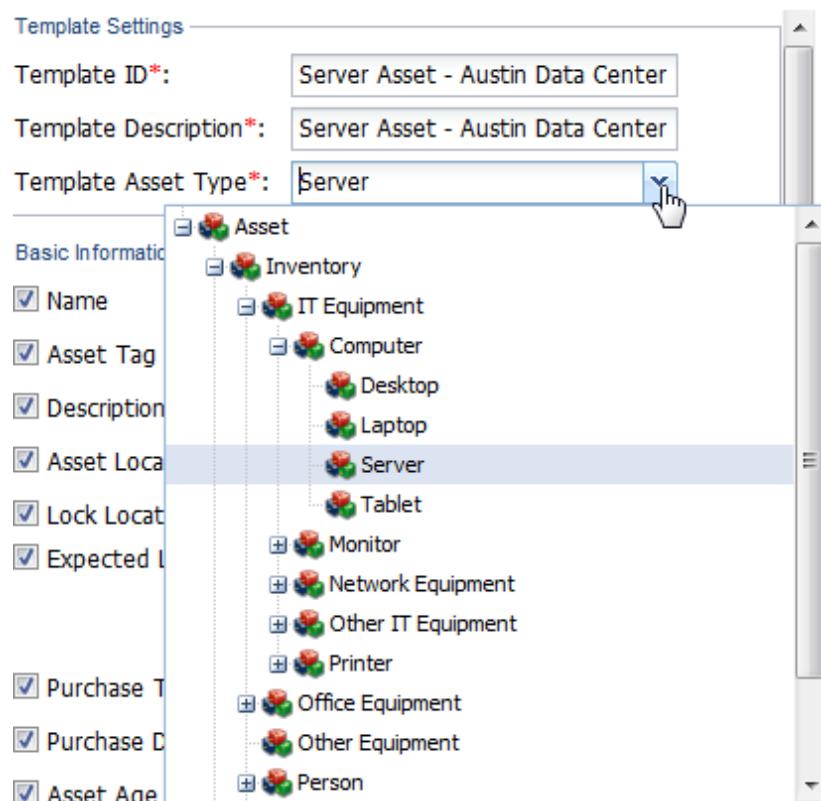
Creating Asset Templates

To create a new Asset Template, perform the following steps:

1. Go to **Customization > Asset Templates** and click the **New** button.



2. Type in a name and description in the **Template ID** and **Description** fields.
3. Select the asset type from the **Template Asset Type** drop-down menu.



NOTE: The list will be populated with the asset types that the Asset Manager administrator has defined.

4. Complete the fields in the Basic Information section and any others that appear.

Unless defined and configured otherwise, the first fields in the Basic Information section are the same for all Inventory Assets.

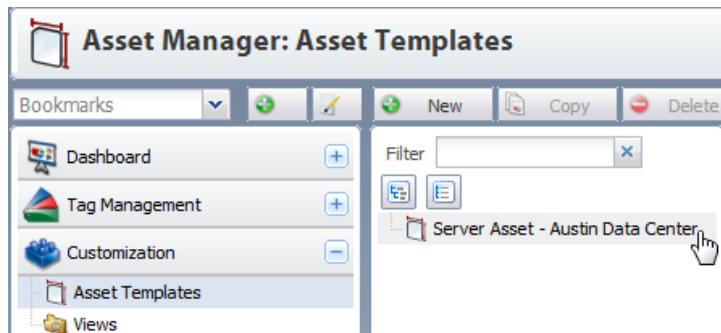
Basic Information	
<input checked="" type="checkbox"/> Name	<input type="text"/>
<input checked="" type="checkbox"/> Asset Tag	<input type="text"/>
<input checked="" type="checkbox"/> Description	<input type="text"/>
<input checked="" type="checkbox"/> Asset Location	Austin <input type="button" value="x"/> <input type="button" value="v"/>
<input checked="" type="checkbox"/> Lock Location	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Expected Location(s)	<input type="text"/> ...

Computer Inventory Assets will have Attributes specific to the Computer Asset Type. Additionally, the Server Asset Type will have the Attributes inherited from its Parent Asset Type and any others specific to the Server Asset Type.

Computer Details

<input checked="" type="checkbox"/> Processor	<input type="text"/>
<input checked="" type="checkbox"/> RAM Amount (GB)	<input type="text"/>
<input checked="" type="checkbox"/> Storage or Disk Size (GB)	<input type="text"/>
<input checked="" type="checkbox"/> Operating System	<input type="text"/>
<input checked="" type="checkbox"/> MAC Address (xx:xx:xx:xx:xx:xx)	<input type="text"/>
<input checked="" type="checkbox"/> Server Form Factor	<input type="text"/>
<input checked="" type="checkbox"/> System U Height	<input type="text"/>
<input checked="" type="checkbox"/> System Criticality	<input type="text"/>
<input checked="" type="checkbox"/> Server Use	<input type="text"/>
<input checked="" type="checkbox"/> System Weight	<input type="text"/>

After completing the fields, the new Asset Template will appear in the list of available templates.



NOTE: After creating a template, when you click the New button you will be able to select the Asset Template that you created and the form will display the template input fields that are associated with that Asset Template.

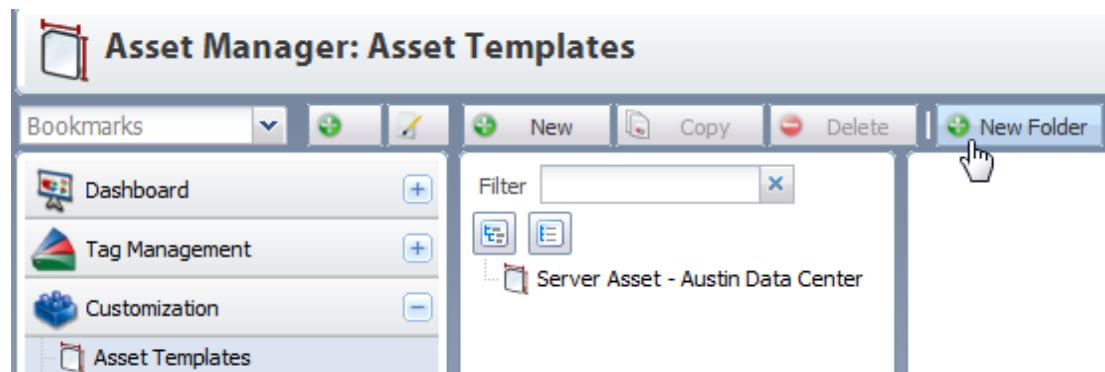
NOTE: As when creating new assets without using pre-populated templates, you will need to fill in the fields that are not pre-populated with default input data and then click the **Save Changes** button.

Creating Folders for Asset Templates

To create a folder for similar Asset Templates, perform the following steps:

NOTE: Folders can be created from and within many of the major Task configuration areas in Asset Manager and function the same regardless of where they are created and used.

1. Click the **New Folder** button.

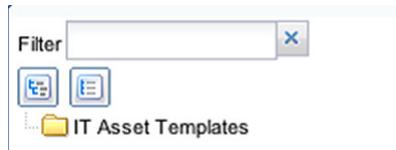


The New Folder pop-up window appears.



2. Type in the name and click the **Create Folder** button to create the new folder.

The folder will now appear in the Data tree on the left.



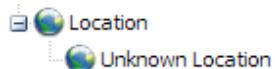
To edit the folder, click the **Edit Folder** button and the Edit Folder Box will appear.

To delete a folder, click the **Delete Folder** button and the folder will disappear from the data tree.

3. Click the **Save Folder** button to save the new folder changes.

Locations and the Location Hierarchy

Locations in Asset Manager are organized in a hierarchy and represent the physical locations in your organization or area of deployment. A location hierarchy is a top-down grouping of your locations, beginning with a large single category that contains all the others and then moving down, as from Country (US) to State (TX) to City (Austin, Dallas, Houston). Items within a level are peers; items one item up or down are said to be parents or children. The Location Hierarchy is unpopulated upon installation except for the top-level *Location* and an *Unknown Location*.



NOTE: The hierarchical structure works best when items are created from the top down.

NOTE: RF Code recommends that you create your Location Hierarchy and import a Location Configuration before adding any assets to Asset Manager. Files can be imported at any time after Asset Manager has been configured.

xxx-yyy	DRAFT 66	7/2/2015
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Best Practice for Location Hierarchies

1. Create your location hierarchy during your needs assessment or from the information collected during that process. Where are the areas you need to monitor and the assets you intend to manage? Include all locations, and consider possible expansion.
2. Format Locations to fit within Asset Manager's data schema. The schema's expected groups are:
 - Country
 - State
 - City
 - Campus
 - Building
 - Floor
 - Zone
 - Room

Use as many of these groups as appropriate, beginning at the highest practical level. As a best practice, create logical levels even if you have only a single item in that level; that is, even if you have sites only within one City, it is a good idea to include a level named for your city, in case of expansion or integration later on. Each of your location's names must be unique, and all should have meaning to the system's users.

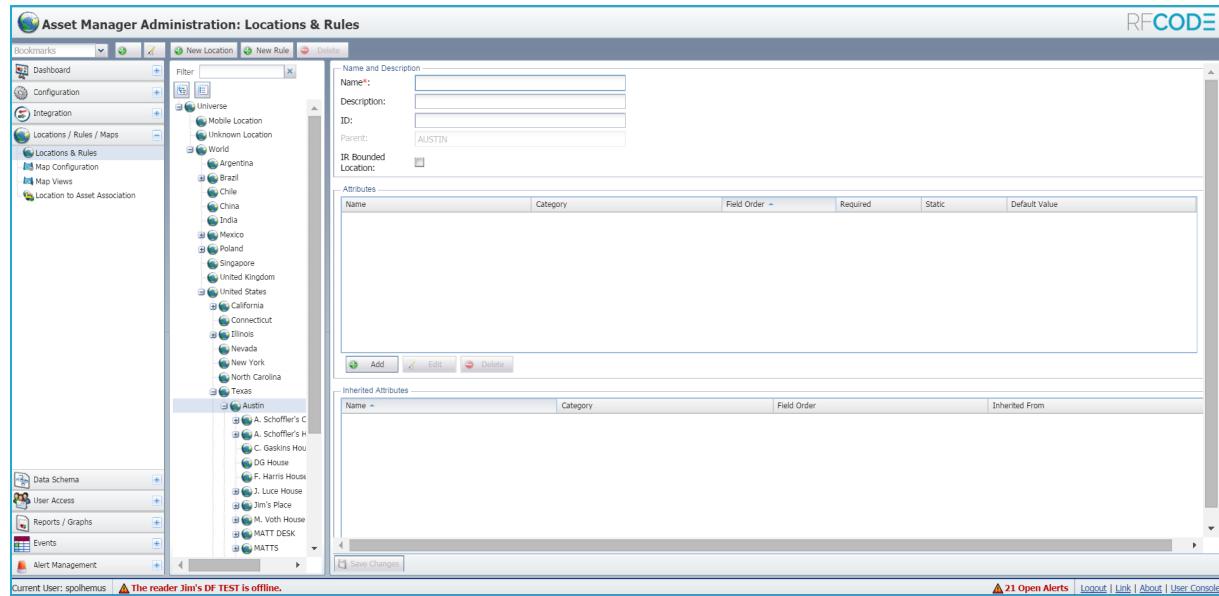
NOTE: If you are integrating with third-party products, location hierarchies must match across systems.

3. Manually create or [import your Location Hierarchy](#) to Asset Manager before beginning to add assets.

xxx-yyy	DRAFT 67	7/2/2015
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NOTE: Location names must be unique. It is common practice to string Location-level names together in order to uniquely identify each Location, especially at the most granular layers. For example, in a data center with multiple rows of server racks, the racks might be named with a row number preceding the rack number, as *Rack 01-01, Rack 01-02*.

Add New Location



The screenshot shows the 'Asset Manager Administration: Locations & Rules' interface. On the left is a navigation sidebar with various options like Dashboard, Configuration, Integration, Locations / Rules / Maps, and Map Views. The main area has tabs for 'New Location', 'New Rule', and 'Delete'. A 'Name and Description' section contains fields for Name*, Description, ID, Parent (set to 'AUSTIN'), and IR Bounded Locations. Below it is an 'Attributes' table with columns for Name, Category, Field Order, Required, Static, and Default Value. Another table for 'Inherited Attributes' is also present. At the bottom, there are buttons for Add, Edit, and Delete.

1. To add a new location manually, navigate to **Admin Console > Locations/Rules/Maps > Locations & Rules**.
2. Click the Location level beneath which your new location will reside. For your first top-level location, this is **Location**. With the location level selected, click the **New Location** button.
3. Enter the name and description you would like for this location and click **OK**.

Add Attribute to Location

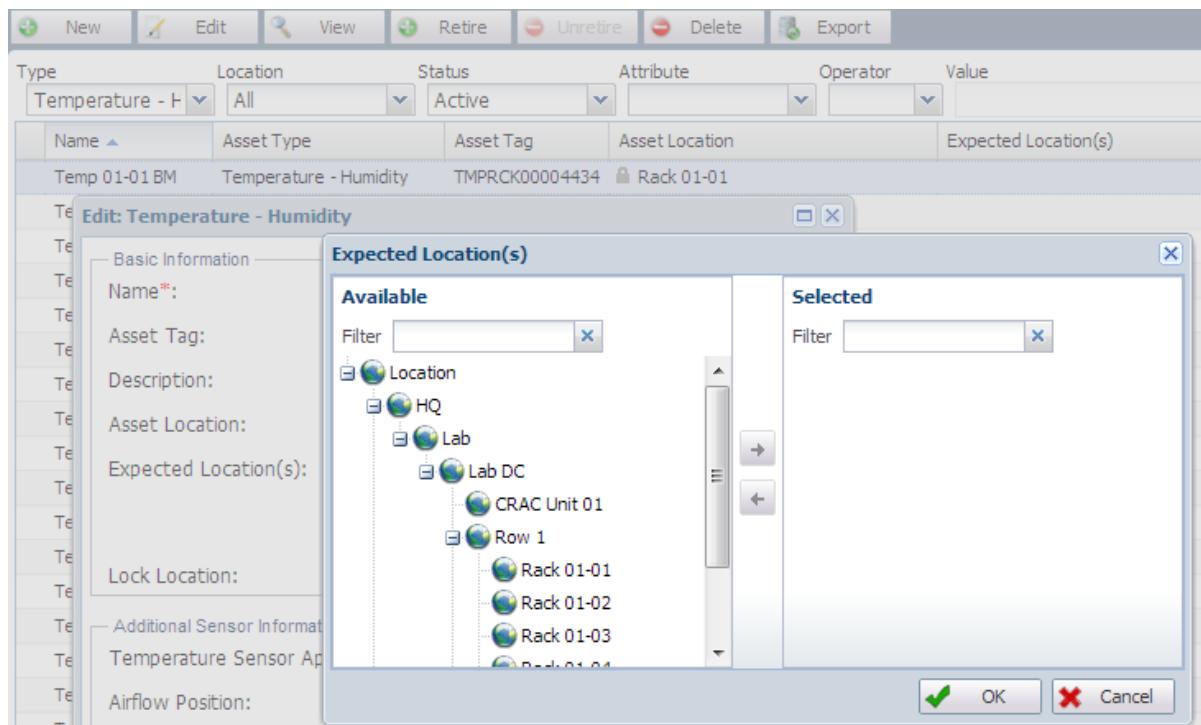
Attributes can be assigned to locations as they can to assets.

xxx-yyy	DRAFT 68	7/2/2015
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1. To add an attribute to a location, select the location you would like to add the attribute to from the tree on the left. In the task pane to the right, there are three categories (Name and Description, Attribute and Inherited Attributes). Under the Attributes category, click the **Add** button.
2. Choose an attribute from the list, choose a category and field order for this attribute, select or deselect the value required box and enter a default value for the attribute. Click **OK** to continue.

Expected Location

When you populate the system with your assets, you have the option to define an expected location. Expected Locations are just that: where an asset is expected to be.

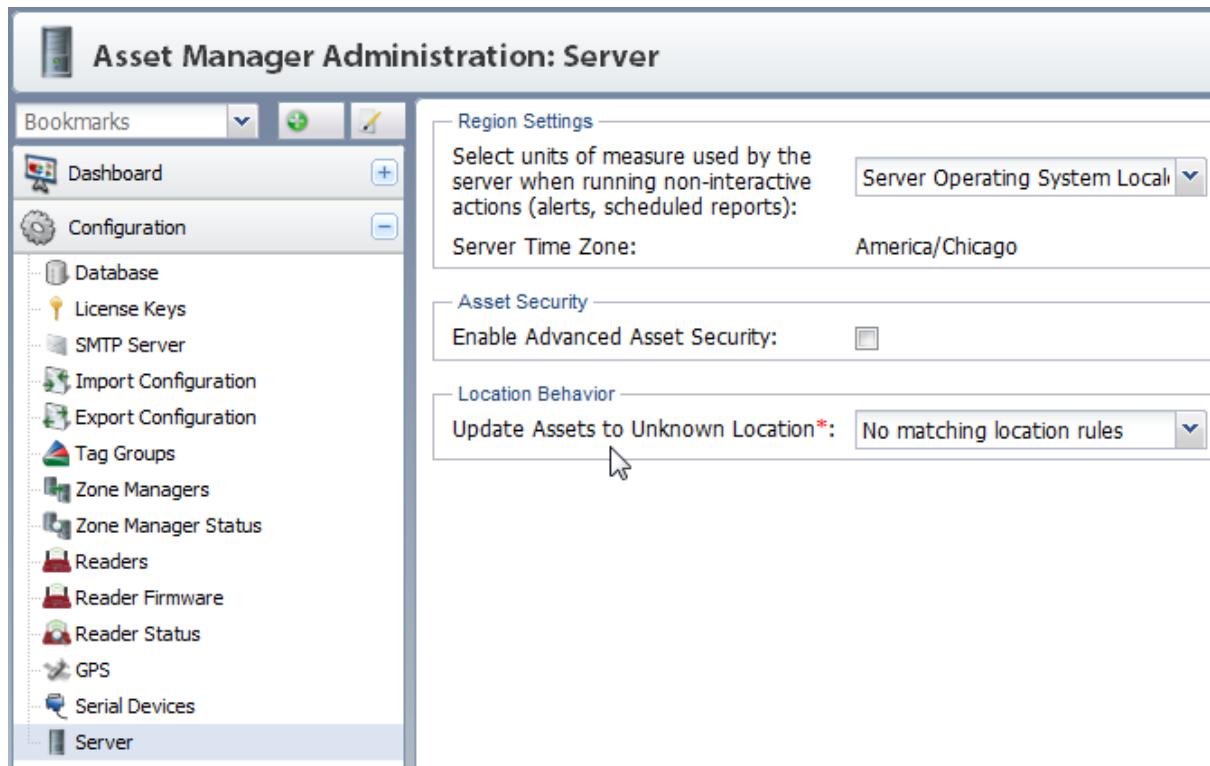


If a tag reports that it (and the Asset associated with it) are not at the Expected Location, then you can be alerted or determine the next course of action to take for managing your asset. If Asset Manager cannot determine the current Location of an Asset, the Location field will display “Unknown,” or it will display the last known Location, depending on how Asset Manager has been configured.

Determining where an asset actually is located is a function of server configuration, readers, tags, locators, and/or rules. Server configuration for Locations is covered in the [Configuration for Unknown Locations](#). Configuration for readers, tags, locators, and/or rules is covered in those respective sections.

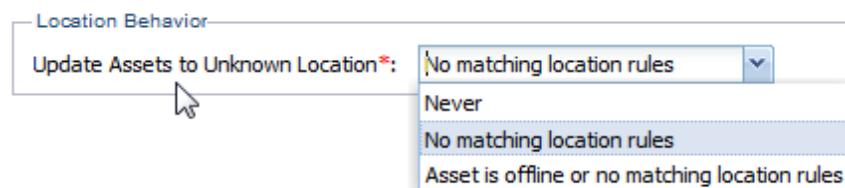
Configuration for Unknown Locations

The administrator has the ability to control the behavior of how the Location field displays its value. This behavior is controlled in the Admin Console from the **Configuration** task under **Server**.



The screenshot shows the Asset Manager Administration interface for a server. The left sidebar contains a navigation menu with various options like Dashboard, Configuration, Database, License Keys, SMTP Server, Import Configuration, Export Configuration, Tag Groups, Zone Managers, Zone Manager Status, Readers, Reader Firmware, Reader Status, GPS, Serial Devices, and Server. The 'Configuration' option is currently selected. The main panel is titled 'Asset Manager Administration: Server' and contains several configuration sections: 'Region Settings' (selecting 'Server Operating System Local'), 'Asset Security' (checkbox for 'Enable Advanced Asset Security' is unchecked), and 'Location Behavior' (dropdown menu for 'Update Assets to Unknown Location*' showing options: 'No matching location rules' (selected), 'Never', 'Asset is offline or no matching location rules', and 'No matching location rules').

Here you can configure the **Update Assets to Unknown Location** field.



A close-up view of the 'Update Assets to Unknown Location*' dropdown menu. The menu items are: 'No matching location rules' (selected), 'Never', 'No matching location rules', and 'Asset is offline or no matching location rules'. The 'No matching location rules' item is highlighted with a blue selection bar.

xxx-yyy	DRAFT 70	7/2/2015
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You can have Asset Manager display an Unknown Location value for Location based on three possible conditions:

- **Never:** to maintain the assigned location even if the asset is offline or its location cannot be determined based on location rules
- **No matching location rules:** to display Unknown Location when an asset's location cannot be determined by any location rules in the system
- **Asset is offline or no matching location rules:** to display Unknown Location when the asset goes offline or when an asset's location cannot be determined by any location rules in the system

NOTE: For greater precision in locating and determining the location of assets, RF Code provides IR location hardware with line-of-sight precision in order to add a further layer, or measure, of confidence when determining the location of an asset.

Add a Rule to a Location

Assigning rules to locations can help to fine-tune the interpretation of tag location through the specification of reader channel SSI thresholds or through the use of IR Codes (if you use IR tags and Room Locators or Rack Locators).

To add a Rule to a Location:

1. Select a Location from the Location Hierarchy.
2. Click the **New Rule** button.
3. From the drop-down list, select the type of rule you would like to add.

xxx-yyy	DRAFT 71	7/2/2015
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NOTE: [Rule Types and Configurations](#) are defined in the table below.

NOTE: When the Match by IR Locator Rule is selected, a field titled Zone Manager will appear in the Rule Configuration box. The administrator is now able to specify which particular Zone Manager the rule applies to. This allows the administrator to duplicate IR Locator Numbers for different Zone Managers and causes the selected rule to be only applied when the specific IR Location Number is seen on the specified Zone Manager. The administrator will be able to choose from any of the Zone Managers that have been configured.

NOTE: IR-based rules overrule SSI rules; a rule based on signal strength indicators (SSI) will not be able to pull an asset out of an IR-defined Location.

4. Fill in the required fields and click **Save Changes**.

The rule appears in the Locations & Rules tree under the specified location.

Channels of a reader appear in the left panel only when a reader's Zone Manager (configured in Reader Configuration) is online.

Rule Types and Configuration Options

The following table contains the names and descriptions of the Rule available for assignment to different Locations in the Location Hierarchy.

NOTE: Almost without exception, you will choose one of the first two Rules, either **Match by Simple SSI** or **Match by IR Locator**. If neither of these Rules seems to be working for whatever reason, please contact RF Code Support for assistance before adding one of the other Rules to the Location Hierarchy.

Rule Type	Description
Match by Simple SSI	Location based on threshold SSI values for one or more reader channels (at least one must be above the threshold).
Match by IR Locator	Location based on received values for the irlocator attribute (on tags with IR sensors), with optional restriction on reporting reader channels.
Match by Average SSI	Location based on threshold average of SSI values for one or more reader channels.
Match by strongest SSI, relative to reference tags	Location based on tag SSI, as in Match by Simple SSI Rule, except that at least one reference tag must also be present, and above a minimum SSI.
Match by SSI when near to reference tag	Location based on reader's proximity to a reference tag, thus causing all tag trans- missions received by the reader to conform to the reference tag's SSI values or Zone.
Match by Portal Entry/Exit SSI	Location based on threshold SSI values for one or more reader channels, divided into "inside" and "outside" sets, and matching the location if the current or most recent best match was a channel in the "inside" set.
Match if near GPS matching coordinates	Location based on the tags matching with a reader that is providing a geo-physical position matching a given set of constraints.

Rules for Matching by Simple SSI

To use the Simple SSI rule, name it, enable it, and accept the default SSI settings unless you have contacted RF Code Support for guidance.

Rule:	Match by Simple SSI
Basic Information	
Name*:	<input type="text"/>
Description:	<input type="text"/>
Rule Configuration	
Enabled:	<input checked="" type="checkbox"/>
SSI Threshold (Minimum)*:	-90 <input type="button"/> dBm
SSI Threshold (High Confidence)*:	-60 <input type="button"/> dBm
Reader Channel List*:	<input type="button"/> ...

Rules for Matching by IR Locator

To use the IR Rule, name it, enable it, associate it with the ID of an IR Locator (Room or Rack), and accept the default Rule Configuration settings unless you have contacted RF Code Support for guidance.

xxx-yyy	DRAFT 74	7/2/2015
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Rule: Match by IR Locator

Basic Information

Name*:

Description:

Rule Configuration

Enabled:

Matching IR Locator*: 001

IR Locator Timeout*: 120 seconds

Reader Channel List:

Zone Manager: Local Zone Manager

When IRLocatorRule is selected, a field titled Zone Manager will appear in the Rule Configuration box. The administrator is now able to specify which particular Zone Manager the rule applies to. This allows the administrator to duplicate IR Locator Numbers for different Zone Managers and causes the selected rule to be only applied when the specific IR Location Number is seen on the specified Zone Manager. The administrator will be able to choose from any of the Zone Managers that have been configured in the Asset Manager system to assign the rule to.

Summary Assets

In order to understand Summary Assets, you need to understand the two parts of the system that are associated when you use Summary Assets: Location objects (Locations) and Asset objects (Assets). In the simplest definition, Locations are places while Assets are objects such as inventory items or environmental sensors. A Summary Asset is an asset that is also a location.

A Summary Asset is essentially an association between a location and an asset. By associating locations and assets, you can obtain information about all of the assets and the attributes of those assets at any particular location, whether the location “contains” one or many assets. A useful function of

xxx-yyy	DRAFT 75	7/2/2015
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this association is to use Calculated Attributes to obtain aggregate information about a collection of assets. This information can be as simple as a count of all the assets in a location, for example, all of the servers in a particular data center row, or it can be an industry-standard metric, for example, the Rack Cooling Index (RCI) derived from all of the temperature sensors on all of the racks for a given row of racks or for an entire data center. In addition, these calculated attributes can be used on maps, in reports, to generate alerts, etc., just like any other attribute.

Defining Summary Assets is done by using the “Location to Asset Association” sub-task under Locations/Rules/Maps in the Administrator Console.

An Asset is an item that can be tagged and managed or monitored. A Location in the Location Hierarchy represents a physical place, and can be considered a container: a city contains many campuses, a campus contains buildings, and so on. Summary Assets are managed or monitored like assets **and** contain other assets that must be managed or monitored; likely examples include delivery vehicles or racks in a data center.

A Summary Asset is required in order to use calculated attributes. Racks must be created as Summary Locations to monitor Rack Cooling Index (RCI) compliance and for some reports and views that use aggregated data such as the highest rack input temperature for a row or pod.

NOTE: A Summary Asset is an asset, and like all assets consumes a license.

Working with Summary Assets

A Summary Asset can be used just like a standard Asset. It can be defined with any number of attributes just like standard Assets, and will appear in the Table View. The default schema has three types of assets already defined in the system in a hierarchy which represents “best practice” for defining and structuring Summary Assets within Asset Manager. This best practice is based on RF Code expertise and extensive deployment experience. At the top level of the hierarchy is the following structure:

- **Inventory:** Inventory Assets represent assets that are being tracked and managed.
- **Sensor:** Sensor Assets represent sensors that are being managed.

xxx-yyy	DRAFT 76	7/2/2015
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- **Summary – Location:** Summary – Location assets represent the Summary Assets that are being managed.

The screenshot shows the Asset Manager interface with the 'Manage Assets By Location' option selected in the left sidebar. A modal window titled 'Create New Asset' is open, displaying a dropdown menu for 'Asset Type' with various asset categories listed. The main table view shows a list of assets under the 'Low Battery' category, including entries like 'BeautTesting', 'asset', 'test asset2', 'test asset3', 'Just an Asset', 'justasset', 'testing3', 'testing2', and several asset tags starting with 'RFCRCK000000'. The bottom of the screen shows a status bar with a low battery warning and 257 open alerts.

Within the hierarchy under all the main Asset types are subtypes. These can also be altered or changed in the Schema Editor if necessary.

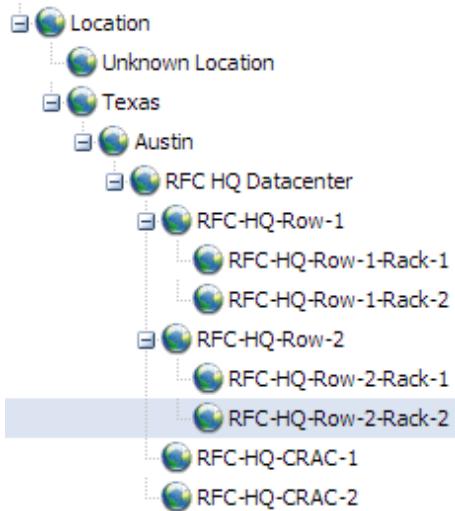
By grouping each of these types of Assets as peers, you can easily configure Table View filters and Reports to use specific categories of Assets. For example, if you want to view all of your Sensors, all it takes is a single click. The same is true for all Summary Assets .

Out of the box, Asset Manager contains only a single Summary Asset (Summary – Location). However, both of the default asset schemas available for immediate import offer the following hierarchy of summary assets from which you can build your own structures.

When you create a Summary Asset and associate it to a Location, be sure to select the appropriate level or point in the hierarchy in order to properly classify the Summary Asset.

Summary Assets and Locations

A Location can represent a campus, a building, a floor, a room, a sub-room, as well as rows of a data center and even individual racks in a data center. In the Administrator Console, Locations are modeled as a location hierarchy or location tree.



Above is an example of Locations defined in the location tree that represent a data center with six rows (A-F) and 10 racks in each row. Notice that the Locations get more specific deeper into the location tree (for example, Austin Data Center > Row A > Rack 1).

A Summary Asset – an Asset that represents a Location – is a unique object that must be explicitly created by the system Administrator. Not all Locations need to be represented by a Summary Asset. It depends upon the Location and the needs of the end users, which is why it is left up to the Administrator to decide and create. When you create a Summary Asset, you are associating (tying) it to a specific Location. Any location can have a corresponding Summary Asset associated to it.

Some locations have an obvious need to be treated as both an Asset and a Location. A good example of this duality is a Location that represents an IT Rack in a data center. Each rack is clearly a Location that holds other Assets (for example, servers, appliances, storage systems). However, each IT Rack is also an Asset unto itself that needs to be tracked and managed. Another example is a mobile location, such as a truck or a ship, both of which are themselves assets, but both can also contain other assets.

Summary Assets and Assets

On the User Console, Asset objects (Assets) are created to represent the assets that are being managed and tracked. Assets can be inventory items such as computers, monitors, etc. or they can be sensors such as temperature sensors, humidity sensors, etc. Assets can have a variety of attributes

xxx-yyy	DRAFT 78	7/2/2015
---------	-------------	----------

associated with them such as name, serial number, asset tag ID, location, date of installation/deployment, color, weight, size, cost, warranty status, sensor values, etc. Assets can be placed (automatically or manually) into locations represented by the location tree.

It is important to understand that Locations and Assets are separate structures that behave differently and which are created in different parts of the system. Locations are not Assets and Assets are not Locations. Locations represent places and can only be created on the Administrator Console. Assets represent things and are created on the User Console. Summary Assets tie the two together.

Summary Asset Attributes

Each type of Summary Asset can have a variety of additional attributes to make the definition of the Summary Asset more useful. Depending on the type of Summary Asset, the attributes available for configuring it may change and present drop-down boxes that help to further define the Summary Asset.

The following is a Summary Asset configuration screen for a Data Center:

The screenshot shows a Windows-style dialog box titled "Edit: Data Center". It contains two main sections: "Basic Information" and "Configuration".

Basic Information:

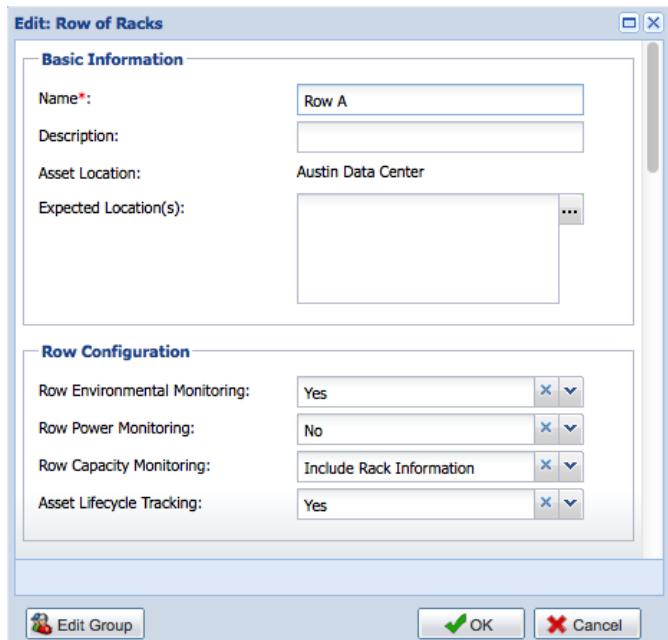
- Name*: Austin Data Center
- Description: (empty)
- Asset Location: (empty)
- Expected Location(s): (empty)

Configuration:

- IT Environmental Monitoring: Yes - Including CRACs
- Asset Lifecycle Tracking: Yes

At the bottom are buttons: "Edit Group" (with a person icon), "OK" (with a green checkmark), and "Cancel" (with a red X).

The following is a Summary Asset configuration screen for a Row of Racks:



Using Calculated Attributes with Summary Assets

Calculated Attributes can be applied to Assets and Summary Assets, but not to Locations. A Calculated Attribute applies a formula to data from one or more attributes and stores the result.

Whenever the source attribute data changes, the Calculated Attribute automatically recalculates.

Calculated Attributes applied to a Summary Asset have access to all the attribute data of the Summary Assets and all the assets assigned to that Summary Asset.

Calculated Attributes allow you to customize Asset Manager for your particular needs. You can, for example, create or edit calculated attributes to produce real-time counts of assets in a summary asset (summary - location) to display on a dashboard or use with Conditional Formatting for a map showing environmental conditions.

Several Calculated Attributes are included in Asset Manager, available once you define Summary Assets. Among these are the Rack Cooling Index (RCI) and Return Temperature Index (RTI). For example, if you take the three temperature values of temperature sensors placed at the top, middle, and bottom of a rack and you apply the RCI formula inherent in the RCI Calculated Attribute, you can

calculate the RCI for the rack. By defining a Summary Asset at the row level, you can similarly calculate RCI for the row as well.

Calculated Attributes are defined and configured by the Administrator in the Schema Editor. For more information, refer to the [Calculated Asset Attributes](#) section in this document.

Review of Summary Assets

Summary Assets count as licensed assets. They do not necessarily need to be created for each and every Location defined in the system; it all depends upon your scenario and the level of summary information you wish to collect. For example, to use RCI and RTI metrics, you will need to use those Calculated Attributes associated with the proper Summary Assets. While Summary Assets themselves do not require greater computing resources, the Calculated Attributes associated to the Summary Assets do. The default schemas have Calculated Attributes associated with the Summary Assets; therefore, using a large number of Calculated Attributes can result in higher CPU utilization and database activity on the Asset Manager server. When needed, you can always create new Summary Assets. Finally, as with any other Assets, you can use all of the following with Summary Assets: Table Views, Map Views, Dashboard Views, Alerts & Thresholds, Reporting, and Graphing.

Associating Locations to Assets

You can associate a location to a new asset or to an existing asset. Follow the first three steps below and then one of the two subsequent sections, depending on whether you are associating the location to a *new* asset or to an *existing* asset.

To associate a Location to an Asset, perform the following steps:

1. In the **Administrator Console**, navigate to **Locations/Rules/Maps > Location to Asset Association**.
2. From the list of locations in the hierarchy, select the location that you want to associate to an asset.

xxx-yyy	DRAFT 81	7/2/2015
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Asset Manager Administration: Location to Asset Association

Bookmarks

- Dashboard
- Configuration
- Integration
- Locations / Rules / Maps
- Locations & Rules
- Map Configuration
- Map Views
- Location to Asset Association**

Data Schema

User Access

Reports / Graphs

Events

Alert Management

Filter

Logical View

- F. Harris House
- J. Luce House
- Jim's Place
- M. Voth House
- MATT DESK
- MATTIS
- RF Code HQ**
- Jim's Test SSI Rule
- RFC 19th Hole
- RFC Big Bend
- RFC Data Center**
- RFC Row 1
- RFC Rack 1
- RFC Rack 2
- RFC Rack 3
- RFC Row 2
- RFC Row 3
- RFC Hardware Lab
- RFC IT Closet
- RFC Jim's Cube
- RFC Kitchen
- RFC Men's Restroom
- RFC Padre Island

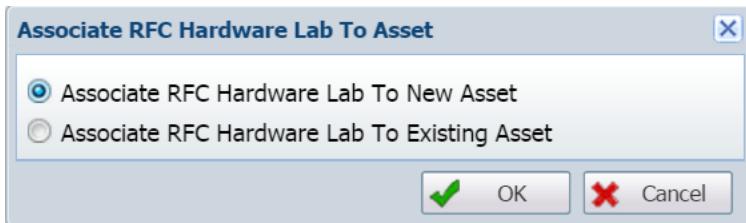
Current User: spolhemus ⚠ The reader Jim TEST is offline.

RF CODE

22 Open Alerts | Logout | Link | About | User Console

- Click the **Associate Asset to Location** button.

A prompt appears with the option to associate the location to a *new* asset or to associate the location to an *existing* asset.

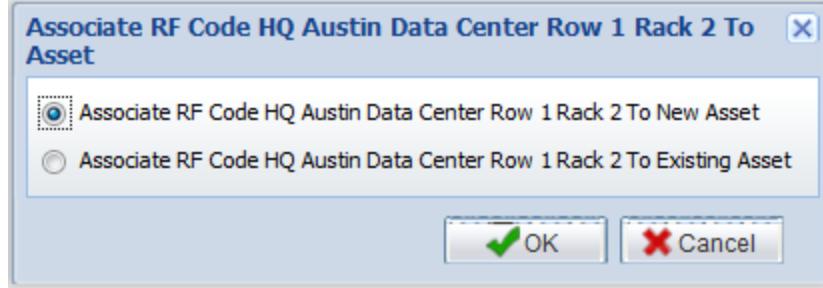


Associating a Location to a New Asset

To associate a location to a new asset, perform the following steps:

- Click the **Associate <Location> to New Asset** option and click the **OK** button.

xxx-yyy	DRAFT 82	7/2/2015
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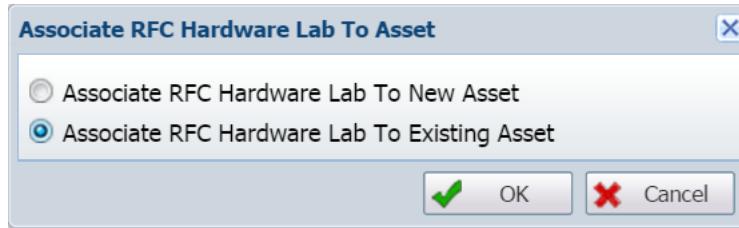


2. You will be prompted to choose an Asset Template or an Asset Type to create a new asset. Depending on the option you choose, the Asset information screen for that Asset Type or Asset Template will appear.
3. Enter the required asset information and click the **OK** button to continue. The location will now appear in the location tree with the location to asset association icon.

Associating a Location to an Existing Asset

To associate a location to an existing asset, perform the following steps:

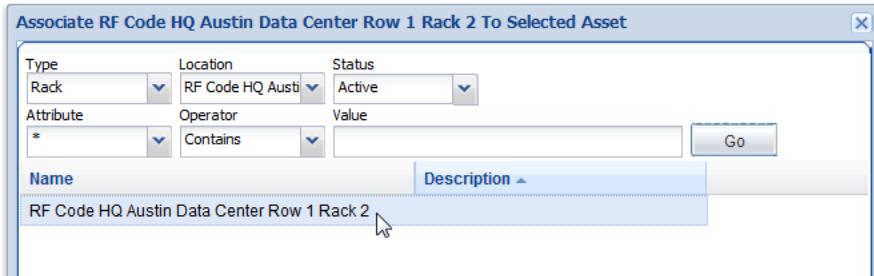
1. Click the **Associate <Location> to Existing Asset** option and click the **OK** button.



You will be prompted to choose an asset to associate this location with.

2. Select the asset by using the filter bar at the top of the dialog to narrow down the results until you find the asset that you want to associate.
3. Click **Go** to list the available assets.
4. Choose an asset from the list and then click the **OK** button to continue.

xxx-yyy	DRAFT 83	7/2/2015
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The location now appears in the asset list to the right and will also appear in the location tree with the location to asset association icon.

Editing a Location Associated with an Asset

To edit an associated asset, perform the following steps:

1. Select the location from the list.
The asset will appear in the right-hand task pane.
2. Select the asset and click the **Edit Associated Asset** button.
The asset information screen will appear.
3. Edit the necessary asset details.
4. Click **OK** when you have finished editing or click **Cancel** to exit.

Removing the Association of a Location to an Asset

You can disassociate an asset from a location. This will not delete or retire the asset; it will only remove the association of the asset to the location. To actually delete an associated asset you must first perform the disassociation described here.

To disassociate an asset from a location, perform the following steps:

1. Select the location from the list and click the **Remove Asset Association** button.
2. When prompted, confirm that you want to remove the asset association.

xxx-yyy	DRAFT 84	7/2/2015
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3. Click the **Remove Association** button to remove the asset association or click the **Don't Remove Association** button to exit.

Asset Attributes

Asset attributes hold specific pieces of information about assets. Administrators may define as many asset attributes as needed to properly represent the various assets to be managed. Asset Manager supports a variety of different types of attributes.

There are three main categories of Attributes: Asset Attributes, Status Attributes, and Calculated Asset Attributes. Asset Attributes are pre-defined and cannot be changed. (A Name is an Asset Attribute.) Status Attributes describe the condition of an asset. (Online Status is a Status Attribute.) Calculated Asset Attributes are created and defined with formulas, and are used for dynamic reporting and alerts of Summary Assets.

Asset Attributes

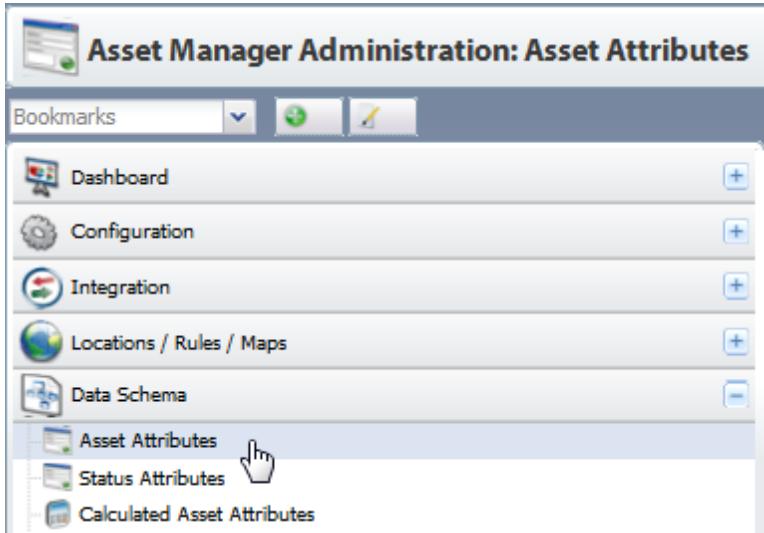
Asset Attributes define properties or characteristics of Assets. Asset Manager's data schema defines Asset Attributes useful in a data center. System Administrators can define as many additional attributes as needed to hold specific pieces of information about assets to be managed or monitored.

Attributes can be added to Asset Types and will then appear in the Create: *Asset* dialog box when users create new Assets.

Create an Asset Attribute

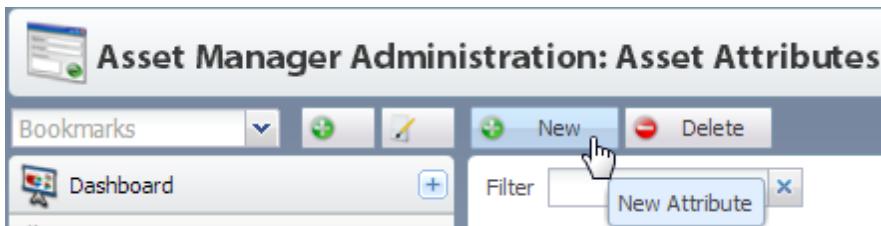
1. Navigate to **Admin Console > Data Schema > Asset Attributes**.

xxx-yyy	DRAFT 85	7/2/2015
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The asset attributes task pane appears on the right. It is divided into two sections, which are the list of defined asset attributes on the left and the asset attribute editor on the right. At the top of the task pane are two buttons which are **New** and **Delete**.

2. Click the **New** button at the top of the task pane.



The asset attribute editor section of the task pane opens a form with fields to configure the new Asset Attribute.

— Name and Type —

Name*:	<input type="text"/>
Description:	<input type="text"/>
Record Value Changes:	<input checked="" type="checkbox"/>
Values Are Unique:	<input type="checkbox"/>
Restrictable:	<input type="checkbox"/>
Hide On User Console:	<input type="checkbox"/>
ID*:	<input type="text"/>
Type*:	Select a type... <input type="button" value="▼"/>

The asset attribute editor is grouped into two areas which are Name and Type and Asset Type (s) Using Attribute. The Name and Type area contains the basic definition of the new attribute. The Asset Type(s) Using Attribute will list all asset types currently using the asset attribute. This list will be empty until the asset attribute is added to an asset type.

3. Complete the required and any desired additional fields.
 - **Name:** Assign a name to the asset attribute. The name is used on all forms to prompt for the asset attribute data, so it is advised to use a clear, concise and intuitive name for the new attribute.
 - **Description:** If desired, input a detailed comment describing purpose or meaning of the asset attribute.
 - **Record Value Changes:** Check this box if this attribute is required for historical reporting. If unchecked, Asset Manager retains only the current value of the attribute; no previous information is available. If checked, all value changes for this attribute for the life of the asset will be recorded for historical reporting and life cycle management.
 - **Values Are Unique:** Check if this value must be unique for each asset. A Serial Number attribute must be unique; a Model Number need not be. Selecting this option ensures that duplicate values are not entered.
 - **Restrictable:** Check this box if you would like this attribute to be one that can be limited to certain Groups.

xxx-yyy	DRAFT	7/2/2015
	87	

NOTE: Group-based restriction is completed in User Access.

- **Hide on User Console:** Check this box if you would like this attribute to be hidden when viewing assets in the User Console. This provides a way to assign attributes and values to assets as an administrative function.
 - **ID:** IDs must be globally unique. The ID field is the identifier the system uses to store the asset attribute values. By default the ID is auto-generated by Asset Manager. However, you may choose to override the auto-generated ID field to simplify import and export purposes. In this case, the ID would equate to the database table column that holds the asset attribute data.
 - **Type:** Choose a Type from the drop-down menu of the Asset Attribute Types. Choose the type that best represents the type of data that users will be entering for the new asset attribute type. For most data types, an additional area will appear for specifying optional value constraints, formatting features, etc. Refer to the [Attribute Types and Descriptions](#) section for more information.
4. Click the **Save Changes** button to save the new Attribute. The new Attribute appears in the list to the left.

The final area in this pane, Asset Type(s) Using Attribute, is empty for a newly created Attribute. It will populate when this Attribute is assigned to Assets.

Attribute Types and Descriptions

The following table contains the possible values for Attribute Types and a brief description of each. Further considerations are presented below.

Asset Attribute Type	Description
Asset Reference	A reference to a particular asset in the system
Boolean	A True/False value
Custom Type List Reference	A list of Custom Type references

Asset Attribute Type	Description
Custom Type Reference	A reference to a Custom Type When an entity contains a Custom Type Attribute, it will inherit the attributes from the Custom Type that is selected as the value of the attribute.
Data Object	Any form of data Examples: images, PDFs, DOC files, XLS files, etc.
Date	A single date, such as January 31, 2008.
Enum	Enum attributes contain an ordered list of selectable values.
Floating Point	Refers to the fact that the radix point (decimal point, or binary point) can "float"; this means that it can be placed anywhere relative to the significant digits of the number. Temperature, a Status Attribute, is of type Floating Point.
Integer	A whole number
String	A string
String List	A list of strings
Tag Reference	Reference to a particular tag in the system
Time and Date	A single date/time accurate to seconds and expressed in GMT NOTE: The Asset Manager web interface will adjust the value of a timestamp value by the browser's time zone, and offset from GMT. No adjustment is made to a timestamp value if the value is being updated via an Asset Manager API.
URL	The Uniform (or Universal) Resource Locator, which is the address of a web page

When choosing the Type for an Attribute, be sure to keep the following points in mind.

Floating Point or Integer: The Units field appears if you choose this Asset Attribute Type. This setting defines how the numerical value is stored on the server; however, it does not enforce how the value is displayed. If a Unit is chosen, the values will be converted and displayed according to the

Units Display setting of the User account. This is useful for expression attributes since the Units needs to match the Units of the original attribute. For example, if you create an Attribute for Max Temperature to be used in conjunction with an existing Temperature attribute, then the Units setting should match, that is, if Units for the Temperature attribute is set to Celsius, then ensure that the Units settings for Max Temperature is also set to Celsius. In addition to the Units field, Floating Point and Integer type Attributes also allow setting a Minimal Value and a Maximum Value.

Integer, Floating Point, String, and URL: All four of these Attribute types let you set a Regular Expression which can be used to validate user input.

NOTE: For more information on regular expressions, search the Internet; abundant learning resources exist on the topic.

String: If the type is String, then an additional area will appear for specifying an optional value constraint of a regular expression which will be used to validate user input. Selecting the **Constrain attribute value to values list** checkbox causes the area to expand and provide an entry area for specifying a list of strings that are valid selections. When the checkbox is selected and this feature is enabled, users cannot type in free-form information and instead must choose a pre-defined value from the list.

NOTE: Entering unconstrained (free-form) string data can make standardized reporting almost impossible when multiple users are entering data into the system. When at all possible, use constrained string lists to allow users to select a choice or multiple choices rather than to allow them to enter free-form string data. However, if you do not constrain values to a list, then use regular expressions in order to ensure that string data is always in the correct format.

String List: A String List is a restricted list that is populated by a pre-defined list of acceptable values. The **Add**, **Edit** and **Delete** buttons provide mechanisms to manage the items in the list. Use the **Up** and **Down** buttons to move an item higher or lower in the list.

Asset Reference: When you define an Attribute as an Asset Reference, an additional area appears in the editor with a drop-down list of Asset Types. This type is used to refer (or link to) an asset that has already been entered in to the Asset Manager database. An example would be an asset attribute

xxx-yyy	DRAFT 90	7/2/2015
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called Connected Display which points to an Asset Type called LCD Display. When a new asset type is added to the system and that asset type is defined with the attribute Connected Display, then the user will be prompted to select from a sub-list of assets, for example, LCD Display. In this way if a desktop PC is added to the system, the LCD display list, which is also in the system, can then be “linked” (refer) to it.

These are just a few of the variable Asset Attribute Type configuration options. For more detailed assistance with configuring Asset Types and Custom Asset Types, please contact RF Code support.

Editing Asset Attributes

To edit an Asset Attribute, perform the following steps:

1. Navigate to **Admin Console > Data Schema > Asset Attributes** and the asset attributes task pane will appear on the right. The asset attributes task pane is divided into two sections which are the list of defined asset attributes on the left and the asset attribute editor on the right.
2. Select the appropriate asset attribute from the list of asset attributes. Once asset attribute is selected, the editor will appear on the right of the task pane displaying the details.
3. Edit the appropriate details of the asset attribute and then click the **Save Changes** button.

NOTE: After an attribute is created, the following three fields cannot be edited: Values Are Unique, ID, and Type.

NOTE: If you want to use the Values Are Unique option for an Attribute, the box must be checked at the time the Asset Attribute is created. The restrictions can be removed at any time; however, you cannot place this restriction on the attribute after it has been created.

NOTE: These fields will appear but will be grayed out. If any of these three fields need to be changed, the asset attribute must be deleted and recreated. Also notice that a new field or prompt is displayed once an asset is created which is Retired.

You should retire an asset attribute that is used by Asset Types when you no longer desire that

xxx-yyy	DRAFT 91	7/2/2015
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the asset attribute be used. To do this, remove this attribute from the list of attributes used by Asset Types. When the attribute is removed, all asset types that use the asset attribute will no longer prompt the user for this particular asset attribute. However, existing assets that do have values for this particular asset attribute will continue to reside in the database and be usable in reports.

NOTE: If there are no Asset Types using the asset attribute and it is no longer needed, then the best course of action might be to delete the asset attribute.

Deleting Asset Attributes

To delete an Asset Attribute, perform the following steps:

1. Navigate to **Admin Console > Data Schema > Asset Attributes** and the asset attributes task pane will appear on the right. The asset attributes task pane is divided into two sections which are the list of defined asset attributes on the left and the asset attribute editor on the right. **Add** and **Delete** buttons are displayed above the task pane.
2. Select the appropriate asset attribute from the list of asset attributes.
3. Click the **Delete** button to delete the asset attribute. If the asset attribute is in use by one or more Asset Types, the asset attribute cannot be deleted; instead, remove the association of the asset to the attribute.

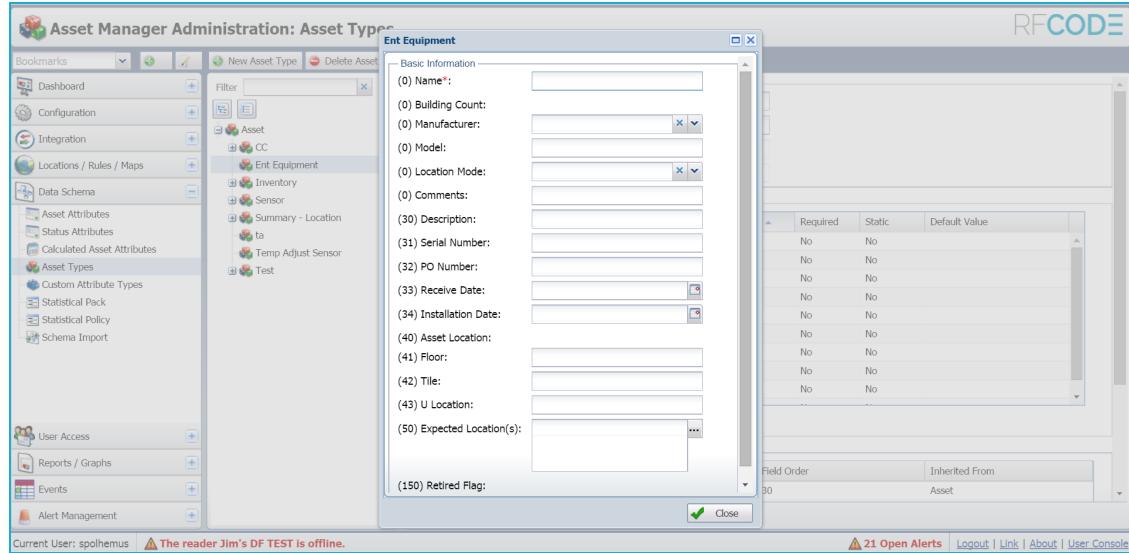
Adding Asset Attributes to Asset Types

Asset Attributes can be added to Asset Types and will then appear on the Asset Input form when users add assets. To add an Asset Attribute to an Asset Type, the Attribute must first be created.

The following steps will guide you through associating or adding an Asset Attribute to an Asset Type:

1. Navigate to **Admin Console > Data Schema > Asset Types**. Select the asset type to which an attribute will be added or associated and then click the **View Sample Input Form** button.

xxx-yyy	DRAFT 92	7/2/2015
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2. Decide where in the form your newly added or associated attribute should appear.
 1. The example in the screenshot, Ent Inventory, has only one selected category: Basic Information. You can add the new attribute this category or select one or more additional categories for the new attributes to be associated with the asset type.

NOTE: Basic Information will always be the top category. If you wish to insert a new category between Basic Information and a second category present on the Input Form of a selected asset type, assign a Field Order number smaller than the smallest Field Order number in the second category.

NOTE: Field Order numbers (in parentheses) to the left of each attribute are arbitrary user-assigned numbers. A best practice is to skip ten digits with each number used, which should leave adequate space for future expansion without having to re-number all of the Asset Attributes.

2. Select the **Attribute** and **Category** and assign a **Field Order**. Click **OK**.

3. Click the **View Sample Input Form** button. The input form appears with the new attributes.

The screenshot shows a software application window titled "Inventory". Inside, there is a section labeled "Basic Information" containing five input fields:

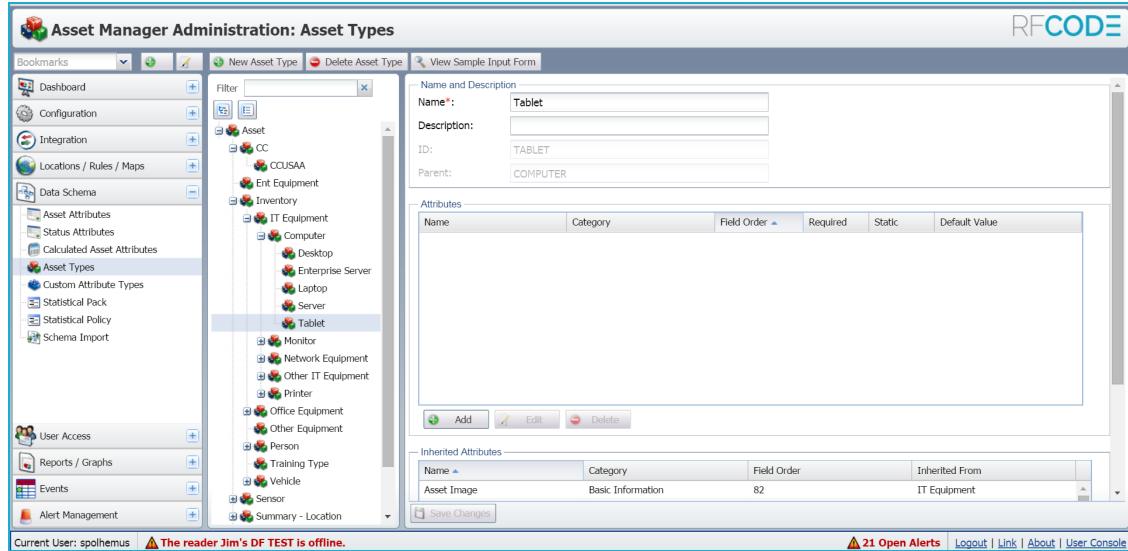
- (0) Name*: A text input field with a placeholder character "I".
- (20) Asset Tag: An empty text input field.
- (30) Description: An empty text input field.
- (40) Asset Location: A dropdown or combobox with a small "X" icon and a dropdown arrow.
- (50) Expected Location(s): A text input field with a "...".

At the bottom right of the window is a "Close" button with a green checkmark icon.

How to Add An Attribute to An Asset Type: Step by Step

1. Select the Asset Type.

xxx-yyy	DRAFT 94	7/2/2015
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In the example above you are using the Asset Type “Tablet.”

Determine where in the Input Form the attributes should go.

Field Order	Attribute Label
(70)	Manufacturer:
(80)	Model:
(81)	Serial Number:
(82)	Asset Image:
(83)	Expected Service Life (Years):
(99)	Days since Service:
(99)	DAY_SINCE_SERVICE_DATE:
(150)	Retired Flag:
(998)	Asset Present Value:
(999)	User List:
(999)	Conditional Asset Present Value:
(999)	Department:
Computer Details	
(1000)	Processor:
(1050)	Reserved:
(1100)	RAM Amount (GB):
(1200)	Storage or Disk Size (GB):
(1300)	Operating System:
(1400)	MAC Address (xx:xx:xx:xx:xx:xx):

The Asset Attribute that we wish to add is the “Screen Size” and this Asset Attribute already exists and is also used by the Asset Types “Laptop” and “Monitors”. Looking at the Sample Input Form, the desired position of the Asset Attribute “Screen Size” is in the section titled “Computer Details” at the bottom of the list. Notice the numbers that are in parentheses to the left of the attribute labels. These numbers are “Field Order” numbers and they are used to determine the order or positioning of the Asset Types that are added to an Asset Type. Asset Manager orders Asset Attributes in an ascending order (smallest to largest) from top to bottom. In this example, in order to make “Screen Size” appear at the bottom of the list it needs to have a field order number greater than 1300.

TIP: The Field Order numbers are arbitrary numbers that you assign. Do not use consecutive

numbers as that leaves no extra space to add additional Asset Attributes in the future should the need arise. A best practice is to skip about 10 digits with each number used leaving adequate space for future expansion without having to re-number all of the Asset Attributes.

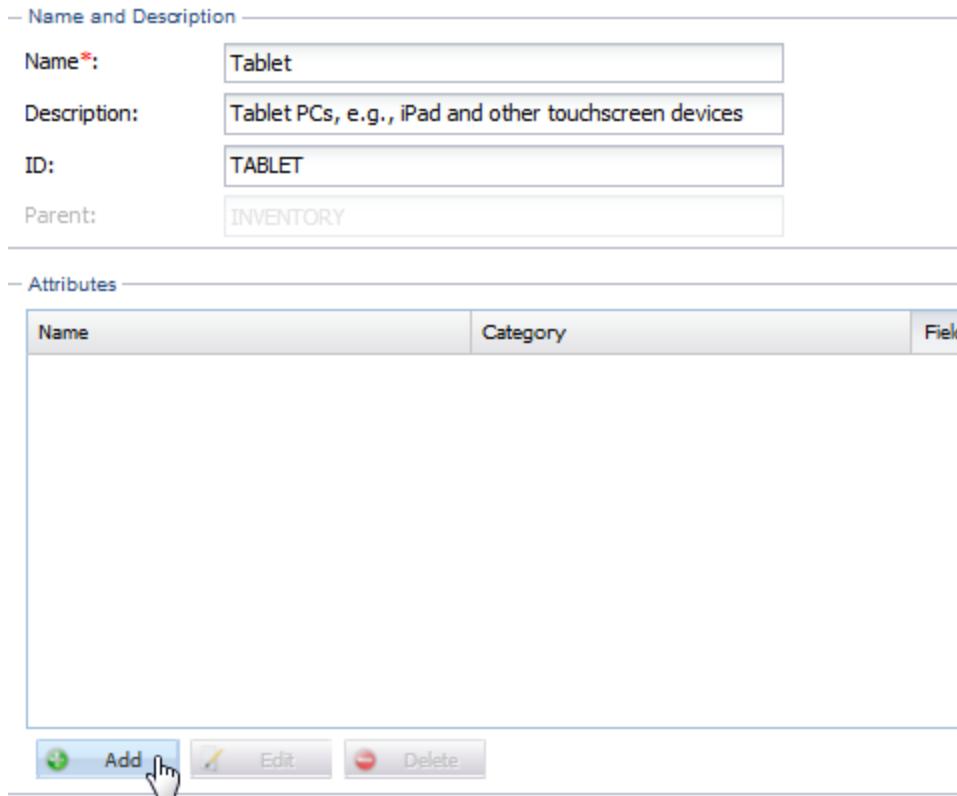
1. In the Asset Type editor area of the task pane, the second section titled Attributes lists the attributes that have been added to the selected Asset Type.

— Name and Description —

Name*:	Tablet
Description:	Tablet PCs, e.g., iPad and other touchscreen devices
ID:	TABLET
Parent:	INVENTORY

— Attributes —

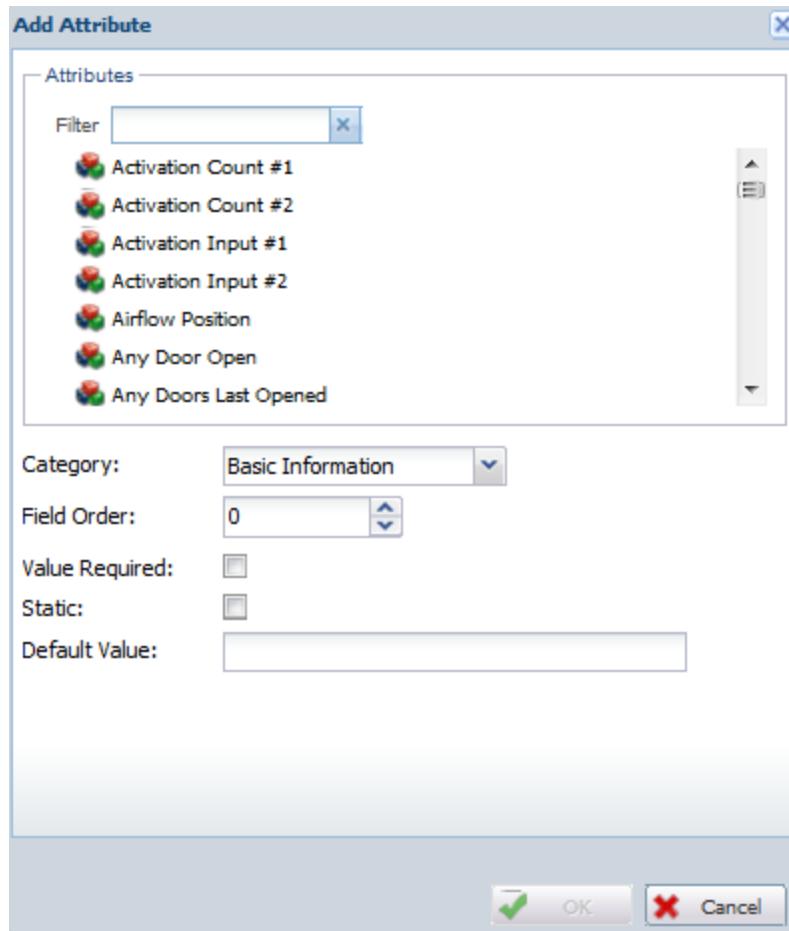
Name	Category	Field



NOTE: For new Asset Types, the list of Attributes will be empty.

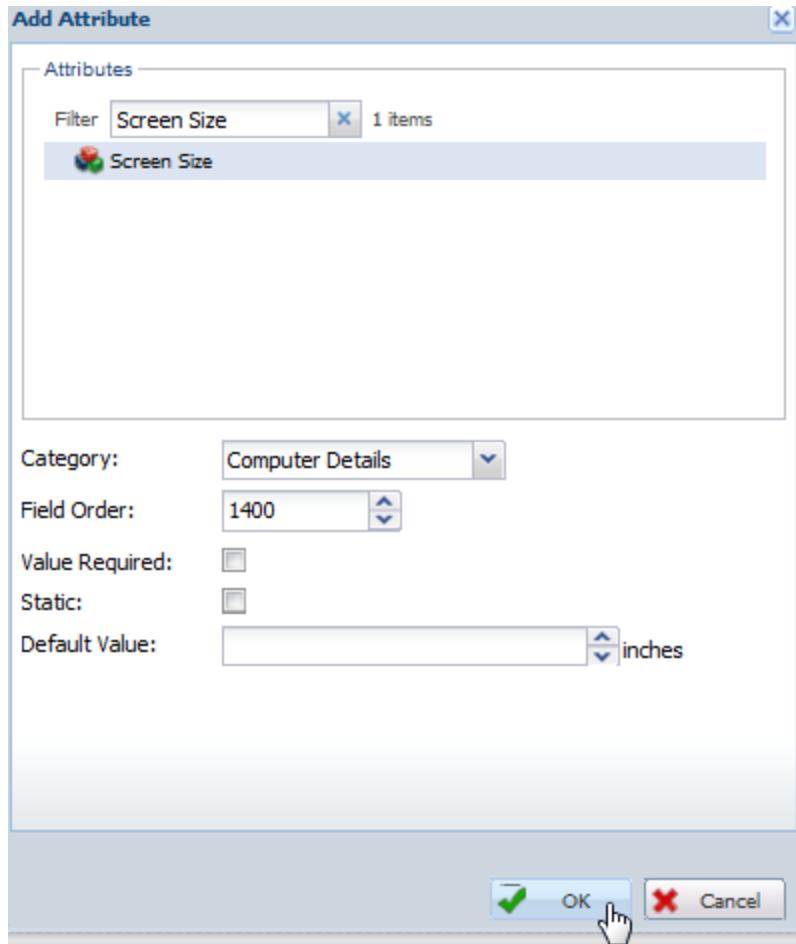
2. To add an Attribute, click the **Add** button.

The Add Attribute window appears.



3. From the **Add Attribute** window, choose an Attribute, for example, Screen Size.
4. Choose a category from the drop-down menu or create a new one as a container for the new Attribute.

NOTE: The Category is simply an arbitrary group of similar Attributes, for example, Computer Details.



5. Assign a **Field Order** number.

The Field Order determines the placement of the Attribute on the input form.

6. To place the new Attribute at the bottom of the list, enter **1400**.

7. Leave the Value Required box unchecked to allow entry of Assets with the Attribute unknown or unspecified.

NOTE: Checking the box requires that when each time a “Tablet” asset is added to the system, this information must be provided in order to save the asset information to the database.

8. Leave the Static box unchecked.

xxx-yyy	DRAFT 98	7/2/2015
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NOTE: By leaving this box unchecked, the value in the “Screen Size” attribute is not changeable and is provided automatically. If the box is checked, then the end-user must choose the default value from the “Default Value” entry box.

9. Click the **OK** button to add the Asset Attribute to the Asset Type.

Attributes					
Name	Category	Field Order ▲	Required	Static	Default Value
Screen Size	Computer Details	1400	No	No	

10. Click the **Save** button.
11. To verify that the Asset Attribute works correctly, click **View Sample Input Form**.

The screenshot shows a 'Tablet' sample input form. It has two main sections: 'Basic Information' and 'Computer Details'. In the 'Basic Information' section, there are fields for Name, Asset Tag, Description, Asset Location, and Expected Location(s). In the 'Computer Details' section, there is a dropdown menu for 'Screen Size' with the value '1400' selected and 'inches' as the unit.

The Attribute Type “Screen Size” appears in the “Computer Details” Category at the bottom of the Attribute list for Tablet Assets.

Editing an Asset Attribute Associated with an Asset Type

Editing the Attributes associated with Asset Types is essentially the same as creating the associations.

To edit an Asset Attribute associated with an Asset Type:

1. Navigate to **Admin Console > Data Schema > Asset Type**.
2. Select the **Asset Type** you wish to edit from the Asset Type hierarchy tree and the Asset Type editor will display the details of the selected Asset Type.
3. Edit the desired information about the Asset Type and click the **Save** button when editing is complete.

Deleting an Asset Attribute Associated with an Asset Type

Removing an Asset Attribute from an Asset Type does not delete any values of that Attribute Type from any assets that have been added to the system. When viewing an asset via the User Console, the information will not be displayed, but it remains in the database and can be accessed using the Asset Manager API or directly in the database (for example, SQL database access).

To delete an Asset Attribute from an Asset Type:

1. Navigate to **Admin Console > Data Schema > Asset Type**. The Asset Type task pane appears on the right.
2. Select the **Asset Type** you wish to edit from the Asset Type hierarchy tree. The Asset Type editor displays the details of the selected Asset Type.
3. In the **Attributes** area of the Asset Type editor, select the **Asset Attribute** you wish to delete and click the **Delete** button.

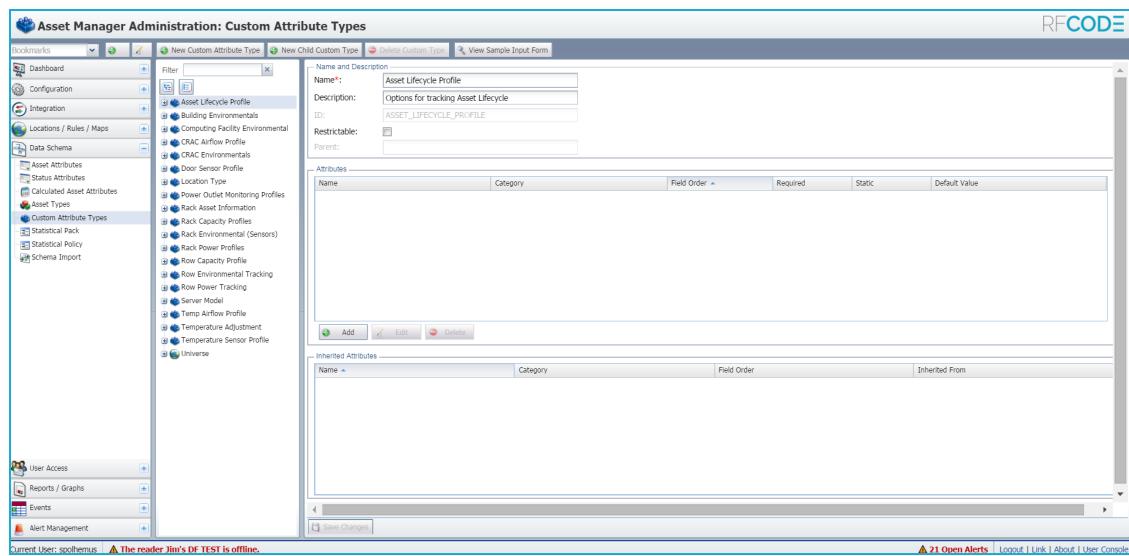
Custom Attribute Types

Custom Attribute Types offer advanced Attribute Type configurations, including the ability to group a number of attributes together, attach text or images to selections, create hierarchical selection options, and add new child attribute types that inherit attributes from their parent types. Asset Manager includes a number of Custom Attribute Types. Systems Administrators can edit these attributes if required.

xxx-yyy	DRAFT 100	7/2/2015
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Creating New Custom Attribute Types

1. Navigate to **Admin Console > Data Schema > Custom Attribute Types** and click **New Custom Attribute Type**, or select a Custom Attribute Type in the menu and click **New Child Custom Type**.



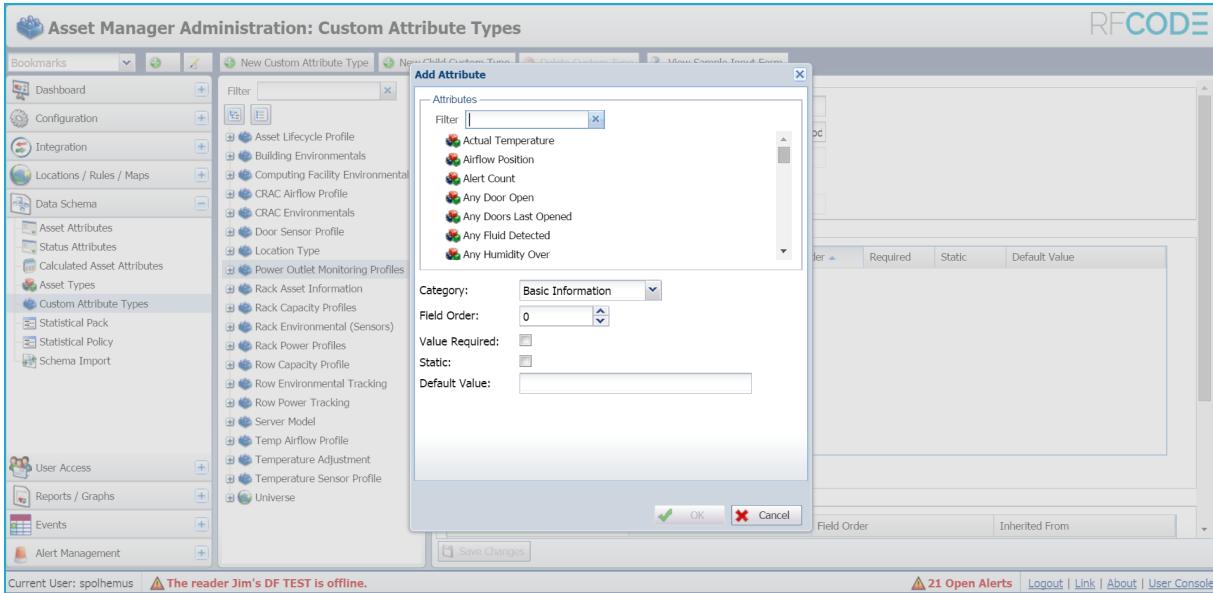
2. Complete the required and any desired additional fields.
 - **Name:** Assign a name to the custom attribute. The name is used on all forms to prompt for the asset attribute data, so it is advised to use a clear, concise and intuitive name for the new attribute.
 - **Description:** If desired, input a detailed comment describing the purpose or meaning of the asset attribute.
 - **Restrictable:** Check this box if you would like this attribute to be one that can be limited to certain Groups.

NOTE: Group-based restriction is completed in User Access.

xxx-yyy	DRAFT 101	7/2/2015
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- ID:** IDs must be globally unique. The ID field is the identifier the system uses to store the asset attribute values. By default the ID is auto-generated by Asset Manager. However, you may choose to override the auto-generated ID field to simplify import and export purposes.
- Parent:** If a custom attribute type is created as a child, the parent attribute's ID will appear here.

3. To Add Attributes, click **Add**. The Add Attribute dialog opens.



- Select an Attribute to add from the list of all attributes created in the system.
- Assign a Field Order number to determine the attribute's placement on the New Asset input form. Field Order is lowest at the top. The number (0) is assigned to Name to ensure that it is always the first field. Before assigning a number, you may wish to view the sample input form.
- Check the Value Required box to make this a required attribute, or leave unchecked.
- Check the Static box if this attribute cannot be changed after an asset has been created.
- Assign or select default values.
- Click the **Save Changes** button to save the new Custom Attribute. The new Attribute appears in the list to the left.

xxx-yyy	DRAFT 102	7/2/2015
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10. To add additional Attributes to the Custom Attribute, click **Add** and complete fields as before.

As with all Attribute Types, Custom Attribute Types must be assigned to Asset Types before they are available to users creating new Assets.

Status Attributes

Status Attributes are pre-defined system attributes that cannot be customized. Status attributes are inherited by Assets. An Asset may have a tag and open alert (or any number of other associations and/or dependencies associated with it), and thus an association between some Assets and Status Attributes cannot be broken.

Status Attributes are immutable in order to preserve the primary details of any Static Attribute, for example, Attribute Type, ID, etc.). This facilitates direct access to the Asset Manager database via SQL query and other reporting tools. However, you can make one of three possible changes that can affect the appearance of the Attribute and whether values for it can be entered by end users.

To view the details of a Status Attribute, perform the following steps:

1. Navigate to **Data Schema > Status Attributes**.

The Status Attributes task pane will appear on the right.

2. From the list of Status Attributes, click on any one to see its properties.

The details of the Status Attribute will appear in the far right window pane.

3. If necessary, check or uncheck the following boxes:

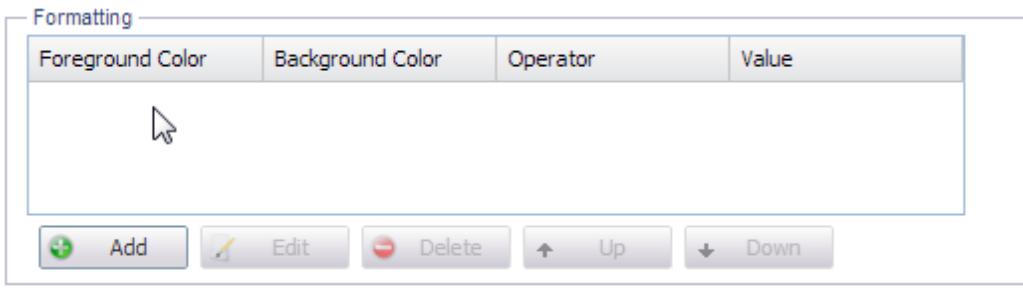
Name and Type

Name *:	T
Description:	R
Record Value Changes:	<input checked="" type="checkbox"/>
Values Are Unique:	<input type="checkbox"/>
Restrictable:	<input type="checkbox"/>

Record Value Changes

Restrictable

4. Apply formatting changes to the Attribute that are triggered by specific values or ranges.



5. Click the **Save Changes** button.

Calculated Asset Attributes

Calculated Asset Attributes are attributes that are derived from computations requiring data from other attributes. The default schemas provided with Asset Manager include a number of Calculated Asset Attributes to enable real-time monitoring and management. These preset calculated asset attributes cannot be changed. The System Administrator can create new calculated system attributes.

Asset Manager Administration: Calculated Asset Attributes

Bookmarks:

- Dashboard
- Configuration
- Integration
- Locations / Rules / Maps
- Data Schema
- Asset Attributes
- Status Attributes
- Calculated Asset Attributes
- Asset Types
- Custom Attribute Types
- Statistical Pack
- Statistical Policy
- Schema Import

User Access:

- Reports / Graphs
- Events
- Alert Management

Calculated Asset Attributes Form:

Name*: [Input Field]

Description: [Input Field]

Record Value Changes: [Check Box]

Restrictable: [Check Box]

Hide On User Console: [Check Box]

ID*: [Input Field]

Type*: [Select Box]

Statistic: [Select Box]

Attribute Expression:

Asset Type(s) Using Attribute:

Status Bar:

Current User: spolhemus | The reader Jim's DF TEST is offline. | 21 Open Alerts | Logout | Link | About | User Console

Three common uses of Calculated Asset Attributes are:

xxx-yyy	DRAFT 104	7/2/2015
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- To calculate a new Attribute for an Asset from an existing Attribute on the same Asset; for example, a warranty expiration date calculated as a difference from asset purchase date
- To calculate one Attribute for an Asset from an Attribute that already exists on a different Asset; for example, the average temperature of a group of assets that involves aggregating the total temperature reported by a group of sensor tags
- To calculate an attribute for an asset from a number of attributes from various assets in a specific location; for example, computing the maximum or average temperature for all sensor tags in a location

Calculated Asset Attributes Overview

Calculated Asset Attributes can be used in Asset Manager in the same way as standard asset and status attributes. They can be used with Reports, Graphs, and Alerts and also can be viewed immediately on-screen. The following types of calculated asset attributes are supported:

- Boolean
- Custom Type Reference
- Date
- Enum
- Floating Point
- Integer
- String
- Time and Date

A Calculated Attribute Formula must be created in order to configure a Calculated Asset Attribute.

The following are components of a Calculated Attribute Formula:

- **Functions:** These are built-in functions that are part of the Asset Manager software that are used to compute the calculated fields.

xxx-yyy	DRAFT 105	7/2/2015
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- **Attributes:** These are the system or asset attributes which will be used to calculate the Calculated Asset Attribute.
- **Standard Mathematical Operators:** These are the various operators that will be used within the formula such as addition, subtraction, multiplication, division, parentheses, etc.
- **Scope:** This is the field of reference or view of the calculated attribute. For example, local scope or location scope.
- **Time References:** These are the time specifications that will be used in the Calculated Asset Attribute.

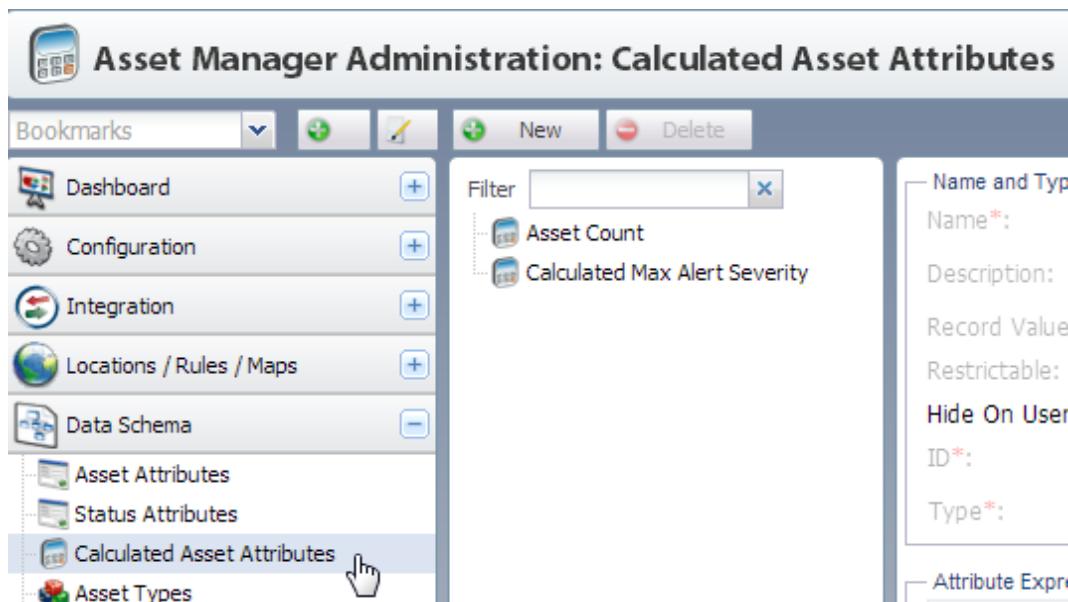
Example: [ASSET_COST * .25]

The formula above produces a result which is 25% of the cost of the asset.

For more information about the Functions available for use in Asset Manager, refer to the [Calculations and Functions Matrix](#) in the Appendix.

Create a Calculated Asset Attribute

1. From the Admin Console, navigate to **Data Schema > Calculated Asset Attributes**.



The screenshot shows the 'Asset Manager Administration: Calculated Asset Attributes' screen. On the left, there is a sidebar with links: Dashboard, Configuration, Integration, Locations / Rules / Maps, Data Schema (which is expanded to show Asset Attributes, Status Attributes, Calculated Asset Attributes, and Asset Types), and Asset Types. The 'Calculated Asset Attributes' link is highlighted with a mouse cursor icon. The main area has a 'New' button and a 'Delete' button. A 'Filter' input field is present. Below it, two items are listed: 'Asset Count' and 'Calculated Max Alert Severity'. To the right, there is a form for creating a new attribute, with fields for Name*, Description, Record Value, Restrictable, Hide On User, ID*, Type*, and Attribute Expr.

2. Click the **New** button.

The Calculated Asset Attributes pane appears.

3. Complete all required and any desired additional fields in the Name and Type pane.

- **Name:** Assign a name to the Calculated Asset Attribute.
- **Description:** If desired, input a detailed comment describing purpose or meaning of the asset attribute.
- **Record Value Changes:** Check this box if this attribute is required for historical reporting. If unchecked, Asset Manager retains only the current value of the attribute; no previous information is available. If checked, all value changes for this attribute for the life of the asset will be recorded for historical reporting and life cycle management.
- **Restrictable:** Check this box if you would like this attribute to be one that can be limited to certain groups.

NOTE: Group-based Restriction is completed in User Access.

- **ID:** This field is automatically generated by Asset Manager when you enter a Name.

- **Type:** Select a type from the drop-down list of attribute types. The Attribute Expression (formula) must resolve to a value compatible with the type selected in this list.

4. Input a formula or use the selection buttons in the Attribute Expression pane to create the formula for the new Calculated Asset Attribute.

- **Attribute:** All compatible Attributes that have been created or loaded within Asset Manager.

- **Asset Attribute:** All Asset Attributes created or loaded into the system.

Select the attribute that you would like to be part of the expression and click the **OK** button.

The particular asset ID with the attribute will appear in the attribute expression box (for example, A_d64ebe78.ANY_DOOR_OPEN).

- **Function:** All available functions included in Asset Manager. This list is grouped into categories for convenience. Click +/- to expand or collapse submenus.

xxx-yyy	DRAFT 107	7/2/2015
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- **Time:** Select a time variable from the list to use a specific time in the creation of the expression.

Calculated Asset Attributes Configuration Settings

The following settings are available when configuring Calculated Asset Attributes:

- **Name:** Assign a name to the calculated asset attribute.
- **Description:** If desired, input a detailed comment describing purpose or meaning of the asset attribute.
- **Record Value Changes:** Check this box if this attribute is required for historical reporting. If unchecked, Asset Manager retains only the current value of the attribute; no previous information is available. If checked, all value changes for this attribute for the life of the asset will be recorded for historical reporting and life cycle management.
- **Restrictable:** Check this box if you would like this attribute to be one that can be limited to certain Groups.

NOTE: Group-based restriction is completed in User Access.

- **ID:** This field is automatically generated when you enter a Name.
- **Type:** Select a type of the attribute from the drop-down list. The Attribute Expression must resolve to a value compatible with the type selected in this list.
- **Attribute Expression:** Enter a calculated attribute expression in this box either through typing in the formula using the proper operators or use the expression buttons beneath the box (Attribute, Function, Asset Attribute and Time) to building the attribute expression from pre-defined choices.
- **Attribute:** This button will bring up a list of all attributes that have been created or loaded within your Asset Manager.

xxx-yyy	DRAFT 108	7/2/2015
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- **Function:**This button will bring up a list of all the calculated attribute functions available for use in Asset Manager. (See table above in Calculated Asset Attributes Overview for a complete list).
- **Asset Attribute:**This button is used to select an attribute that is associated to a specific asset for use in the creation of an expression. Click this button to bring up a list of assets that you have already entered into the system. Select the asset and click **OK**. The list of attributes displays. Select the attribute that you would like to be part of the expression and click the **OK** button. The particular asset ID with the attribute will appear in the attribute expression box (for example, A_d64ebe78.ANY_DOOR_OPEN).
- **Time:**This button is used to select a specific time to use in the creation of the expression. When the button is clicked, select one of the time choices and click **OK**.

Applying a Calculated Asset Attribute to an Asset Type

In the following example, a calculated asset attribute will be applied to an asset type. The calculated attribute expression is a *Warranty Expiration Date* for the *Server* Asset Type.

The formula used in this example is:

```
date( year (PURCHASE_DATE) + 1, month (PURCHASE_DATE), day  
(PURCHASE_DATE) )
```

The functions that will be used are:

date, year, month, day

The attribute that will be used in this example is:

PURCHASE_DATE

NOTE: This attribute has been previously configured using the Asset Attributes sub-task.

To create a Warranty Expiration Date for the Server Asset Type, perform the following steps:

1. Enter the required Name and Type information in the Settings Task Pane. In this example the information should appear as follows:

Name:One-Year Warranty Expiration Date

xxx-yyy	DRAFT 109	7/2/2015
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Description: The date upon which the one-year warranty will expire for an asset.

Record Value Changes: This box should be checked so, for example, if in the future an extended warranty is purchased and this expiration date changes, this occurrence will be recorded to the database.

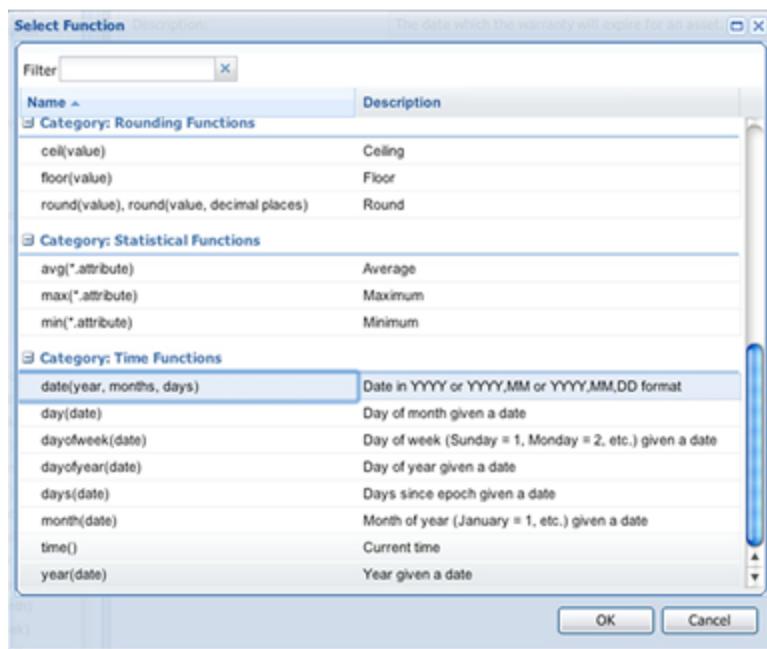
ID: ONE_YEAR_WARRANTY_EXPIRATION_DATE

This is automatically generated from the creation of the name for the calculated attribute.

Type: Time and Date should be selected from the drop-down list.

2. To build the calculated attribute expression (formula), click the **Function** button and from

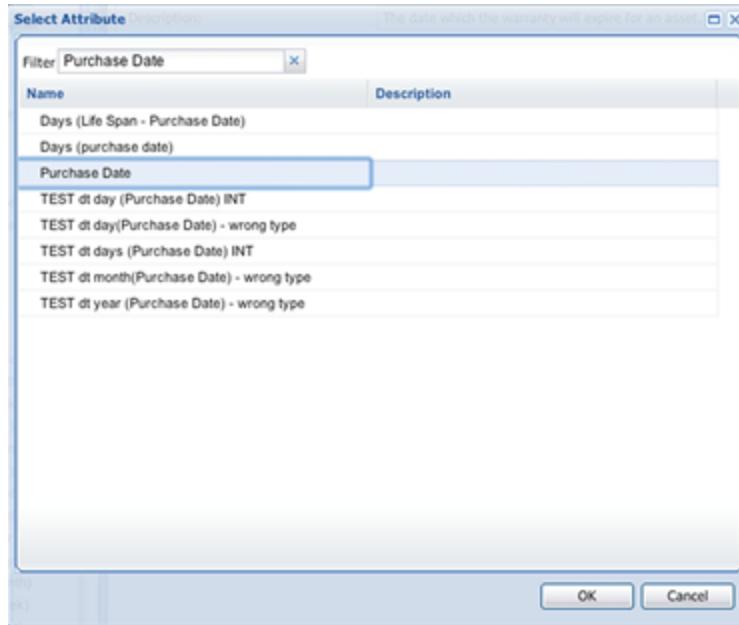
Time Functions, select **date(year, months, days)**.



3. Click **OK**. The function will appear in the Attribute Expression box.
4. Add the attribute to the function by placing the cursor in the *date* function string just after the word “year”.
5. Type an open parentheses “(” and then click the **Attribute** button.
6. Select **Purchase Date** as the attribute.

xxx-yyy	DRAFT 110	7/2/2015
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NOTE: You can use the Filter field to find this attribute by typing the first few letters of the attribute you want to use.



- Click the **OK** button.

The attribute will appear in the attribute expression box.

- Type a close parenthesis “)”.

At this stage the attribute expression will appear as follows:

```
date(year(PURCHASE_DATE), month, day)
```

- Repeat the function assignment for the other two components of the *date* function (month and day).

- Click the **Attribute** button.

- Select the **Purchase Date** from the attributes list and then click **OK**.

- Repeat these steps again for the “day” component of the *date* function.

After completing these steps the function should appear as:

```
date(year(PURCHASE_DATE), month(PURCHASE_DATE), day(PURCHASE_DATE))
```

TIP: Alternatively, instead of using the Attribute button, you can simply type the attribute exactly as it appears above for each time section.

12. Add a one (1) to the *year* component of the *date* function (in order to represent a one-year warranty) to complete the formula by placing the cursor after the closed parentheses of the year (PURCHASE_DATE) parameter and typing **+1**.

The expression will now look like:

```
date(year(PURCHASE_DATE)+1, month(PURCHASE_DATE), day(PURCHASE_DATE))
```

13. Review the expression a final time to ensure that all parentheses are opened and closed properly as necessary for any regular mathematical function in order for the expression to calculate the correct data.
14. Click the **Save Changes** button.

After you create a Calculated Asset Attribute, you need to apply it to an Asset Type.

To apply an Attribute to an Asset Type:

1. Navigate to **Admin Console > Data Schema > Asset Types**. Select an asset type. The right pane populates with details about the asset type.
2. In the Attribute section, click the **Add** button and select the Calculated Asset Attribute that you just created called “One-Year Warranty Expiration Date”
3. Select a category (Calculation) and a field order and then click the **OK** button.
The Attribute will now appear in the Attributes box.
4. Click **Save Changes**.

Now that the Calculated Asset Attribute has been created and applied to an Asset Type, all assets that are assigned the Asset Type (in this example “Asset Tag”) will have a Calculated Asset Attribute that can be used with various other tasks and sub-tasks (Reports, Alerts, etc.)

xxx-yyy	DRAFT 112	7/2/2015
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within Asset Manager.

Name and Description

Name*:	Asset Tag
Description:	
ID:	
Parent:	

Attributes

Name	Category	Field Order	Required	Static	Default Value
Purchase Date	Warranty	1000	<input type="checkbox"/>	<input type="checkbox"/>	
Default Warranty (Year(s))	Warranty	1050	<input type="checkbox"/>	<input type="checkbox"/>	
Extended Warranty	Warranty	1100	<input type="checkbox"/>	<input type="checkbox"/>	
Warranty Expiration Date	Warranty	2000	<input type="checkbox"/>	<input type="checkbox"/>	

Inherited Attributes

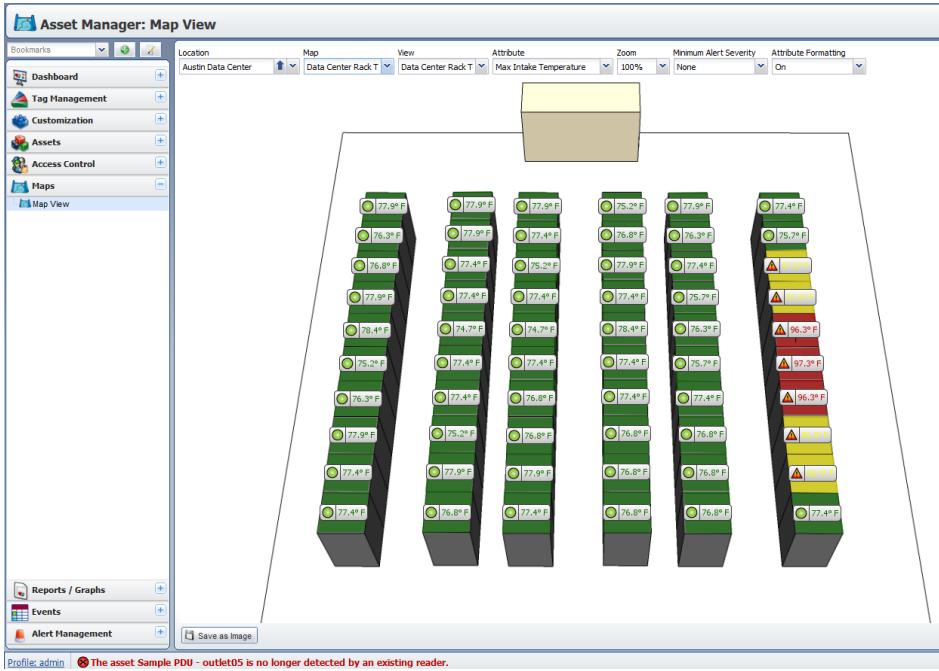
Name	Category	Field Order	Inherited From
Asset Tag	Basic Information	20	Asset
Description	Basic Information	30	Asset
Asset Location	Basic Information	40	Asset
Expected Location(s)	Basic Information	50	Asset
Name	Basic Information	0	Entity Root

Save Changes

Conditional Formatting with Attributes

Formatting for Asset Attributes, Status Attributes, and Calculated Attributes can be configured to conditionally change the foreground and background color of a map item, the text displayed in an asset list, and in Dashboards,a cell in Asset View panels and in Asset grids in the Administrator or User Dashboards, depending on the attribute value.

For example, a numerical attribute can be configured so that the cell background turns red when its value exceeds 100.

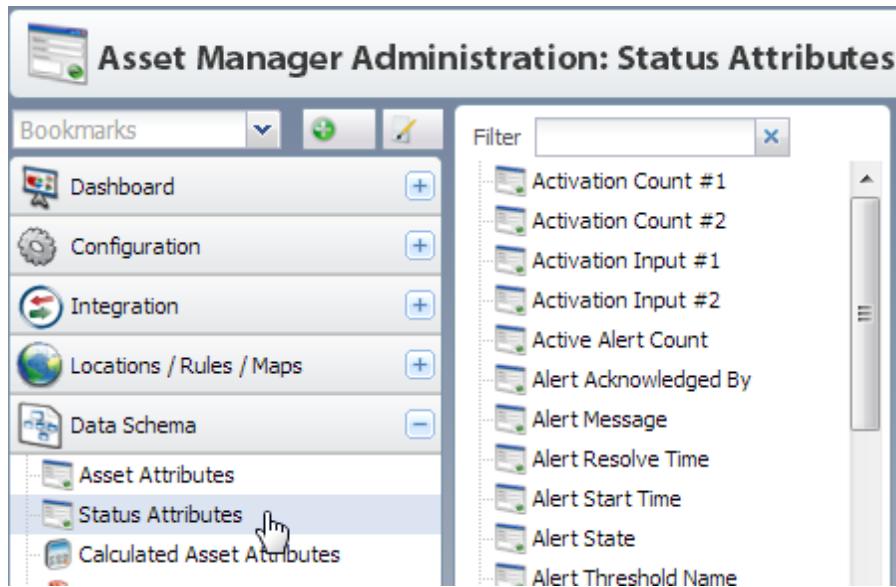


Configure Conditional Formatting for Attributes

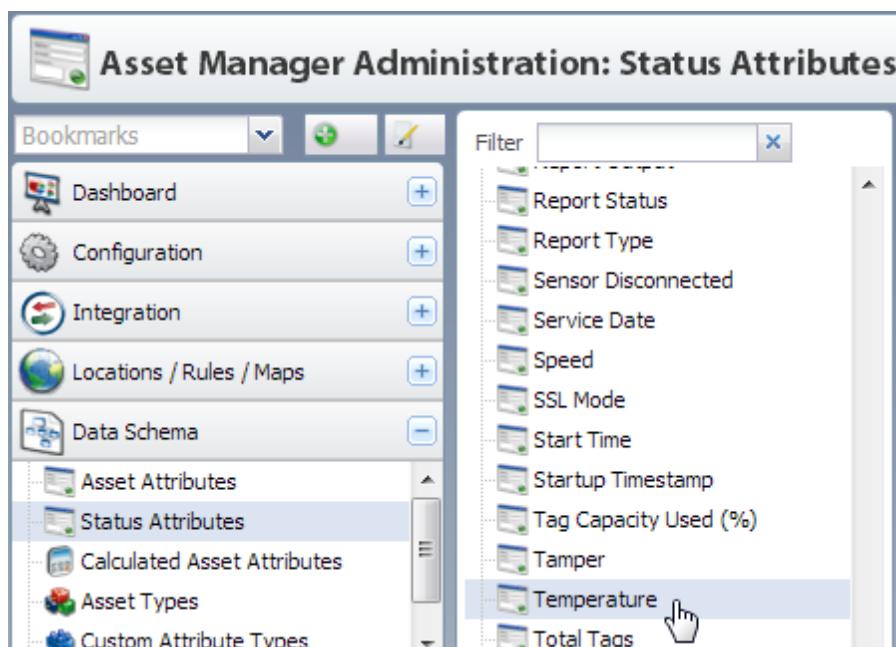
1. Navigate to **Admin Console > Data Schema**.
2. Select the appropriate Attribute category, and within that category select an attribute.
3. In the formatting pane, click **Add**.
4. Add the desired conditions.
5. **Save Changes**.

To configure conditional formatting for an Attribute, perform the following steps:

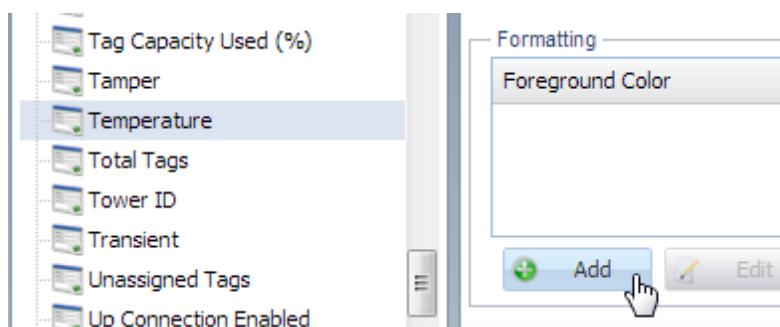
1. In the **Admin Console**, go to **Data Schema > Status Attributes**.



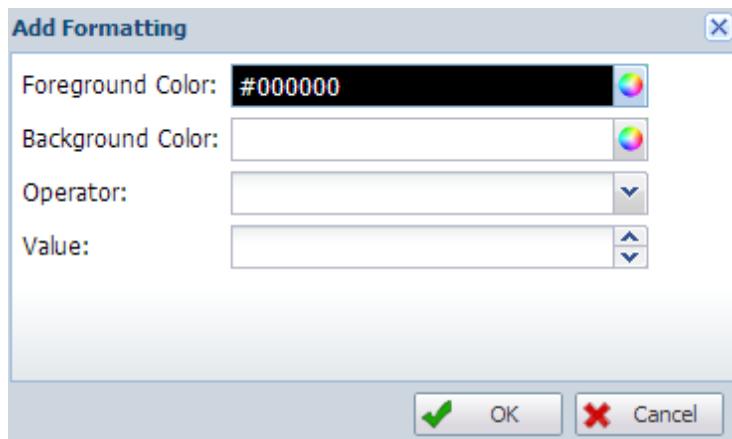
2. Next, choose an Attribute to reformat, for example, Temperature (highlighted in the screenshot below).



3. Under the **Formatting** heading, click the **Add** button:



The **Add Formatting** dialog box will appear:

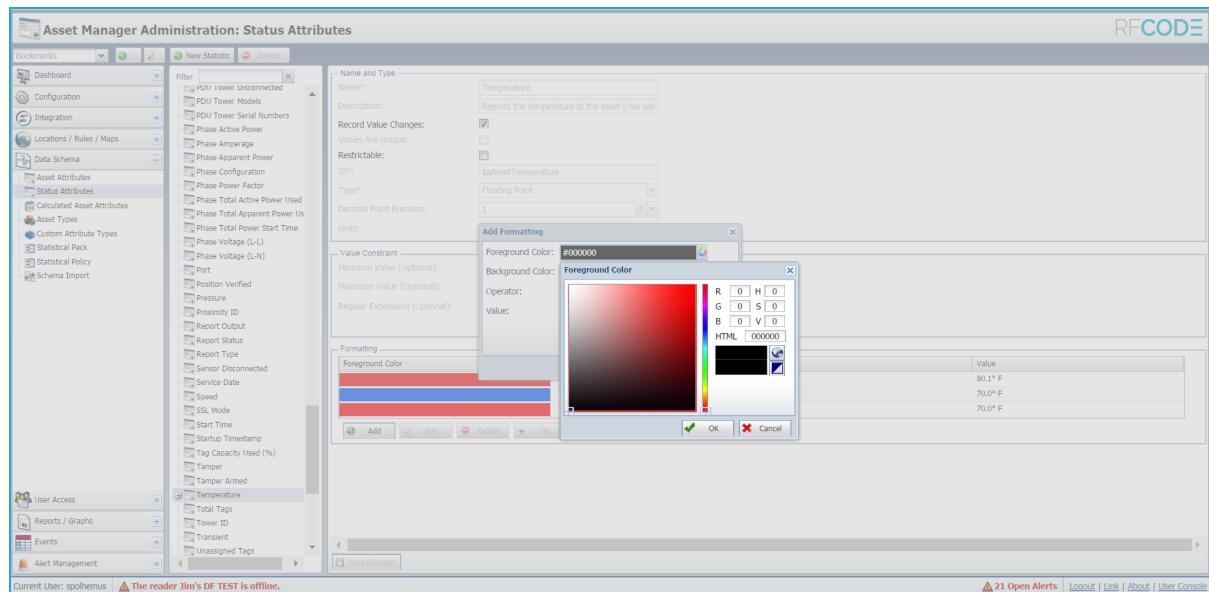


The Add Formatting box has four fields:

- **Foreground Color:** The color of the text itself.
- **Background Color:** The color of the background of the cell.
- **Operator:** Certain mathematical, conditional, or Boolean operands used to define (along with the Value) the scope of the desired formatting. The possible operands (depending on the Attribute) are:
 - = (Equal to)
 - != (NOT Equal to)

- > (Greater than)
 - < (Less than)
 - >= (Greater than OR Equal to)
 - <= (Less than OR Equal to)
 - Contains
 - Does Not Contain
 - Starts With
- **Value:** Depending on the Attribute, this can be a mathematical, conditional or Boolean quantity.

When you click on the drop-down menu for the foreground and background colors, you will get a dialog box with a color palette for you to choose, like in the below screenshot:



For the example “Temperature” attribute, we chose:

- A **Red Foreground Color** when Temperature is **Greater-Than-Or-Equal-To** 80.1 degrees F.

- A **Blue Foreground Color** when Temperature is **Greater-Than-Or-Equal-To** 70 degrees F.
- A **Red Foreground Color** when Temperature is **Less-Than** 70 degrees F.

That example configuration for the **Temperature** Attribute would look like this in the **Formatting** section of the Status Attributes configuration options as seen in the screenshot below:

Foreground Color	Background Color	Operator	Value
Red	Blue	>=	80.1° F
Red	Blue	>-	70.0° F
Red	Blue	<	70.0° F

In the Manage Assets task, the conditional formatting is applied and visible:

xxx-yyy	DRAFT 118	7/2/2015
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Asset Manager: Manage Assets By Location

Bookmarks

Dashboard **Tag Management** **Customization** **Assets**

- Manage Assets**
- Manage Assets By Location**
- Manage Assets By Type**
- Import Assets**
- Asset Builder Jobs**

Filter

Type Status Attribute Operator Value

Type	Status	Attribute	Operator	Value
Asset	Active			
Name	Temperature	Humidity	Fluid Detected	
T+H Sensor 91	77.9° F	40.3% RH		
T+H Sensor 47	77.9° F	40.3% RH		
T+H Sensor 49	77.9° F			40.3% RH
Temp Sensor 14	77.9° F			
Temp Sensor 90	77.9° F			
T+H Sensor 117	77.9° F			40.3% RH
Temp Sensor 234	78.4° F			
Temp Sensor 161	78.4° F			
Temp Sensor 181	78.4° F			
Temp Sensor 206	82.2° F			
Temp Sensor 210	82.8° F			
Temp Sensor 230	82.8° F			
Temp Sensor 226	83.3° F			
T+H Sensor 105	83.3° F			40.6% RH
T+H Sensor 113	83.8° F			40.6% RH
T+H Sensor 115	83.8° F			40.6% RH
T+H Sensor 103	84.9° F			40.7% RH
T+H - CRAC 1 Return	84.9° F			40.7% RH
Temp Sensor 225	86.0° F			
Temp Sensor 209	86.0° F			
Temp Sensor 229	86.0° F			
Temp Sensor 205	86.0° F			
T+H - CRAC 2 Return	87.6° F			40.8% RH
Temp Sensor 103	89.8° F			
T+H Sensor 74	89.8° F			41.0% RH
T+H Sensor 100	89.8° F			41.0% RH
T+H Sensor 98	89.8° F			41.0% RH

Multiple attributes associated with an asset can be formatted conditionally. Multiple rules can be applied to formatting and the value of an attribute is evaluated against rules from the top down. The first rule matched determines the formatting.

System Notifications

Overview of System Notifications

System notifications take the form of Events and Alerts. Both can be accessed and configured in the Admin Console and in the User Console. Both Events and Alerts enable the Administrator and

Users (who have the necessary Role or Permissions) to configure notifications about states of the Asset Manager system, which includes RF Code hardware used to monitor it, as well as notifications about the state of the assets you are managing and the environment you are monitoring. In other words, the former (Events) allow administrators to set conditions for when and how they want to be notified about something within the Asset Manager system. When information within the Asset Manager system changes in a way that satisfies these conditions, the Events sub-system sends notifications to users or outside systems based on the actions that are configured for the event.

Alerts have a “set condition” and a “clear condition” (or a “begin” and “end”), while Events do not need to have a beginning and end for notifications but rather use “triggers,” configured by the administrator, that will cause an Event notification to be produced. The events feature might be used to send data from Asset Manager to other software systems or to notify users when certain conditions occur, while the latter (Alerts) are configured to ensure that you know the location of your assets, their operational state, and conditions of the environment in which they are being used.

The following is a summary of the differences and similarities among Events and Alerts:

- Events and Alerts are similar in that both Events and Alerts can be configured with the same types of notifications (Actions), which include sending email, posting messages via HTTP, writing notification messages to logs, etc., with the exception that Alerts can also be sent to Serial Devices.
- Events and Alerts are different in the following ways:
 - Events happen by Triggers, which are configured using Asset Condition Filters in both the Admin Console and the User Console, although the latter has an additional Trigger setting called Security that can be configured to define the Execution User Account.
 - Alerts happen at Thresholds, which are configured by setting a hardware state, asset state, or environmental state beyond which the Alert will occur. Threshold configuration differs between the Admin Console and the User Console in the following way:

xxx-yyy	DRAFT 120	7/2/2015
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- The Admin Console is used to configure Alert condition filters for the following: Reader conditions (high traffic, noise, offline, tag capacity) and Zone Manager conditions (offline). You can also set a Global Alert Policy in the Admin Console that affects all alerts for all users.
- The User Console is used to configure Alert condition filters for the following: Asset Offline Conditions, Custom Conditions, Pressure Conditions, Door States, Fluid Leaks, Humidity Conditions, Low Battery States, Motion Detected Conditions, Tamper States, Temperature Conditions, and Unexpected Conditions.
 - Alerts create historical events in the “Alert Viewer”, where Events do not generate a historical event.

NOTE: An essential prerequisite to using email for notifications of any Event or Alert is to configure SMTP, which is described in the [Configuring SMTP](#) section.

The Global Alert Policy task allows an administrator to suspend Alert Actions or both Thresholds & Alert Actions.

SMTP and System Notifications

Asset Manager sends notifications from the system about assets, environmental conditions, events, etc. as well as notifications about the status of various system components, for example, reader states, Zone Manager states using an SMTP server. The SMTP server configuration settings are simple, but provide for several mail transfer security options as described in the Configuring SMTP section below.

When Asset Manager issues an SMTP send and the message delivery fails, it aggressively retries the SMTP send (to deliver the message) in the following way:

1. **First Attempt:** Wait 1 second
2. **Second Attempt:** Wait 15 seconds

xxx-yyy	DRAFT 121	7/2/2015
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3. **Third Attempt:** Wait 30 seconds

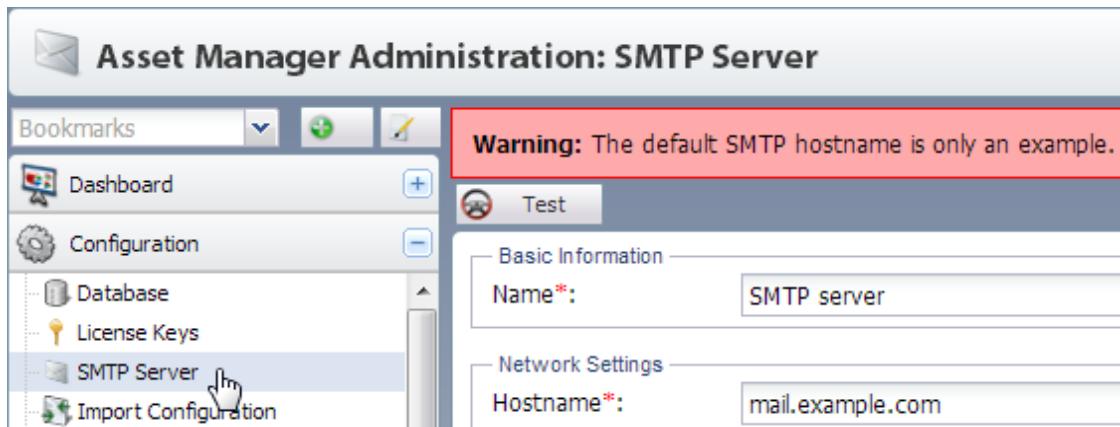
4. **Fourth Attempt:** Abort

Configuring SMTP

In order to send email notifications, you must configure SMTP (Simple Mail Transfer Protocol) settings for Asset Manager.

To configure an SMTP Server:

1. From the **Admin Console**, navigate to **Configuration > SMTP Server**.



2. Under **Basic Information**, input a **Name** for the SMTP server.

3. Complete the **Network Settings** fields.

Network Settings

Hostname*:	mail.example.com
Port*:	25
Connection Security:	<input style="width: 100px; height: 25px; border: 1px solid #ccc; border-radius: 5px; padding: 2px 5px;" type="button" value="None"/> <div style="margin-top: 5px; border: 1px solid #ccc; padding: 2px; background-color: #f9f9f9; width: 150px; height: 100px; position: relative;"> <ul style="list-style-type: none"> None STARTTLS SSL/TLS </div>
SMTP Username:	<input type="text"/>
SMTP Password:	<input type="password"/>
Confirm Password:	<input type="password"/>
From Address:	<input type="text"/>

Hostname: The name of the mail server.

Port: The port of the mail server.

Connection Security: Set the desired secure connection protocol:

STARTTLS: secures an unsecured channel. No additional configuration is necessary to send notifications with Transport Layer Security (TLS)

SSL/TLS: Secure Sockets Layer (SSL) and Transport Layer Security (TLS). Requires that your mail system be configured for SSL.

None: no secure connection protocol.

SMTP Username: The username for an account with admin permissions for the SMTP mail server.

SMTP Password: The password for an SMTP server admin account.

Confirm Password: The same as above.

From Address: The email address of the admin for notifications about the SMTP server-configuration.

4. Click the **Test** button to ensure that the configuration works.

5. Click the **Save** button if the test succeeds; if not, troubleshoot the configuration.

xxx-yyy	DRAFT 123	7/2/2015
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Events

The Events task lets you set conditions that spawn notifications about conditions within Asset Manager. When information changes in a way that satisfies these conditions, the Events sub-system sends a notification to Users or to applications outside of Asset Manager that have been configured to receive them. Events do not need to have a beginning and end for notifications; instead, Events use Triggers that cause notifications to be sent.

All Events have two basic components: Event Actions and Event Triggers.

Event Actions

The Actions sub-task allows the Administrator or Users to create various notification actions for the Asset Manager system.

Event Actions include all of the following types: Email Event Actions, File Transfer Event Actions, HTTP Post Event Actions, Logging Event Actions, SNMP V1 Trap Event Actions, and SNMP V3 Event Actions.

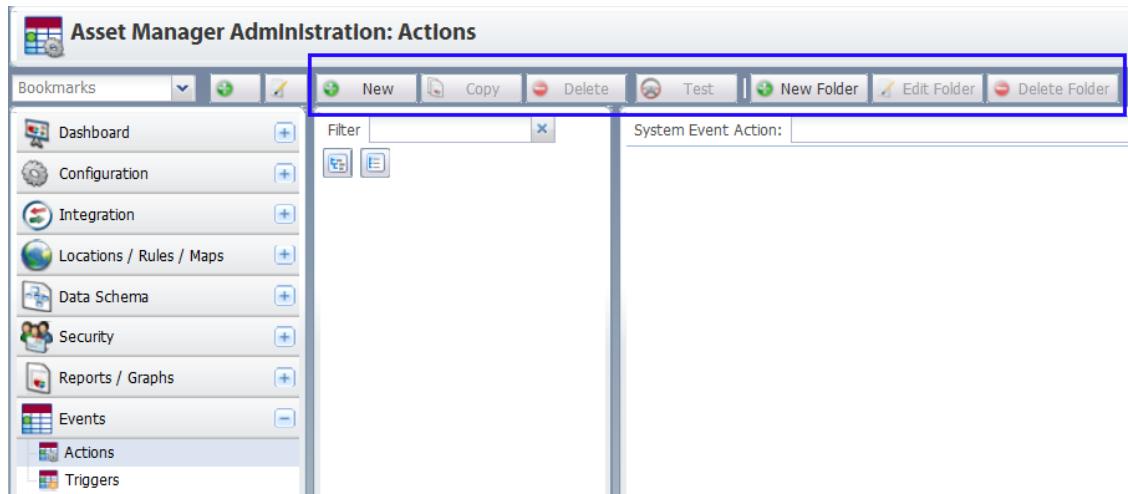
Creating Event Actions

To create a new Event Action, perform the following steps:

1. Navigate to **Events > Actions** and the Actions task pane will appear on the right.

The Actions task pane is divided into two sections: the list of defined actions on the left and the Actions Editor on the right. At the top of the task pane are several buttons: **New**, **Copy**, **Delete**, **New Folder**, **Edit Folder** and **Delete Folder**.

xxx-yyy	DRAFT 124	7/2/2015
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2. To create a folder, click the **New Folder** button.

A dialog box appears.



3. Type in a name and click the **Create Folder** button.

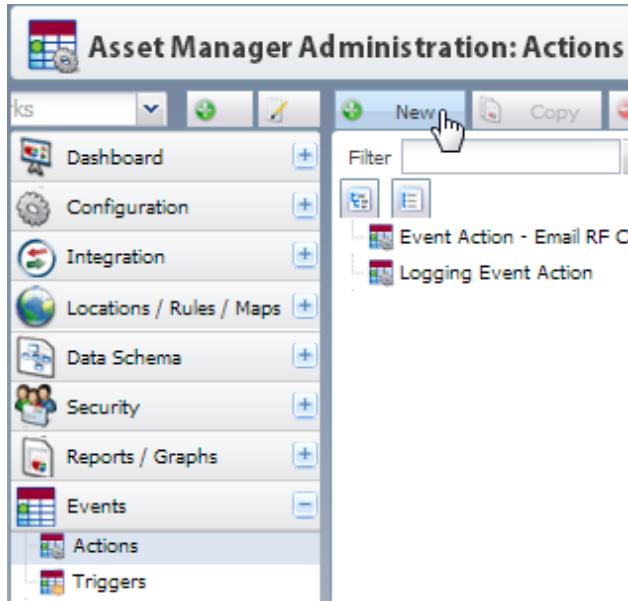
The new folder appears in the folder hierarchy.

The menu above the folder hierarchy contains buttons that let you manage your folders and the Actions categorized within them.

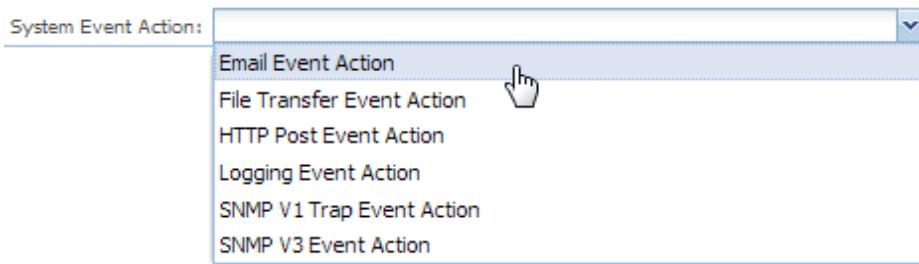
To edit the folder, click the **Edit Folder** button.

To delete a folder, click the **Delete Folder** button and the folder will disappear from the data tree.

4. Click the **New** button (or select a pre-existing action to edit).



5. Choose an action from the drop-down list.



Configuring Event Actions

In both the Admin Console and the User Console, you can create and configure any of the following types of Event Actions: Email Event Action, File Transfer Event Action, HTTP Post Event Action, Logging Event Action, SNMP V1 Trap Event Action, and SNMP V3 Event Action.

The following configuration settings are available for Actions.

xxx-yyy	DRAFT 126	7/2/2015
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Basic Information

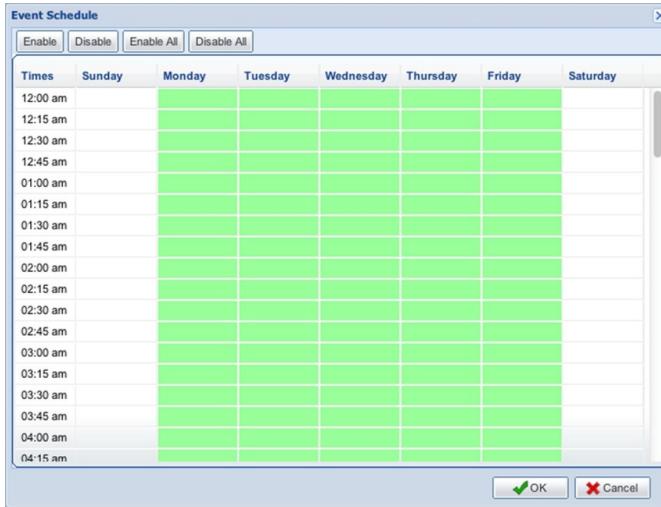
System Event Action:

Basic Information

Name*:	<input type="text"/>
Action Schedule:	Always Active <input type="button" value="..."/>
Enabled:	<input checked="" type="checkbox"/>

Name: Name the action and select the Enabled checkbox to enable it.

Action Schedule: By default, the Action is set to Always Active. However, you can click the Ellipsis [...] button to open a window with scheduling options.



NOTE: By default, the Events Schedule is set with all days and times enabled. Therefore, if unchanged, the Event Action will execute any time the associated event is triggered. In order to disable certain days and/or times, select the days and/or times you want to disable and then click the **Disable** button.

Alternatively, click the **Disable All** button to disable the event schedule for all days and times and then select those days and/or times the Event Action on which should occur, and then click the **Enable** button. (To enable all day and time slots, click the **Enable All** button.)

Enabled: In order for the Alert Action to be active in the system, the **Enabled** box must be checked.

Configuration Settings Specific to Email Event Actions

When you choose to create an Email Event Action, the following fields and settings are available.

Event Action Configuration	
Email Address(es)*:	support@rfcode.com
Event Action Message	
Event Source: \${SOURCE.\$aName} Event Time: \${TIME} Event Trigger Type: \${TRIGGER_TYPE}	
Additional Event Source Information: Name: \${SOURCE.\$aName} Asset Location: \${SOURCE.\$aLocation} Description: \${SOURCE.\$aDescription}	
<input type="button" value="Insert Macro"/>	

- **Email Address(es):** The email address(es) that will receive the Event notification.
- **Event Action Message:** The message about the Event that will be delivered.

NOTE: One or more macros can be configured to generate the Event Action Message. The default Event Action Message is configured with macros in the following way:

Event Source: \${SOURCE.\$aName}

Event Time: \${TIME}

Event Trigger Type: \${TRIGGER_TYPE}

Additional Event Source Information:

Name: \${SOURCE.\$aName}

Asset Location: \${SOURCE.\$aLocation}

Description: \${SOURCE.\$aDescription}

xxx-yyy	DRAFT 128	7/2/2015
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For more information, refer to the [Macros](#) section.

Configuration Settings for Different Kinds of Event Action Alerts

When you choose to create an HTTP Post, File Transfer Event, or a Logging Event Action Alert the following fields and settings are available.

For FTP, HTTP, and Logging actions the information that will be transmitted will be a combination of:

- The replaced values for all macros available to the action (refer to the [Macros](#) section for more information), with the exception of the following macros, which only output a partial date or time: DATE, YEAR, MONTH, DAY, TIME, HOUR, MINUTE, SECOND, MILLISECOND, TIMEZONE_OFFSET.

Configuration Settings for File Transfer Actions Using FTP or SFTP (SSH File Transfer)

The following settings are available when configuring FTP or SFTP (SSH File Transfer) Post Alert Actions:

File Transfer Information

Transfer Protocol*:	FTP
Remote Directory*:	`\${SOURCE_ID}/\${DATE}
File Name*:	`\${TIME}.\${TRIGGER_TYPE}
Primary Host*:	
Primary Port*:	21
Secondary Host:	
Secondary Port:	
Username:	
Password:	*****
Confirm Password:	*****
Data Connection Mode*:	Active

Additional Event Information

Additional Attributes:	Name Asset Location Description
------------------------	---------------------------------------

- **Transfer Protocol:** Select FTP or SFTP.
- **Remote Directory:** Specify the remote directory path where the file will be saved. Macro values can be used to specify the directory.
- **File Name:** Specify the file name where the event information will be saved. Macros can be used to specify the file name.
- **Primary Host:** - Input the hostname of the FTP server.
- **Primary Port:** Select the Port over which to communicate with the FTP server (by default this is 21).
- **Secondary Host:** Input the hostname of the secondary sever to post to if posting to the primary server is unsuccessful (optional).

xxx-yyy	DRAFT 130	7/2/2015
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- **Secondary Port:** Select the Port over which to communicate with the secondary FTP server.
- **Username:** Enter the username for connecting with the FTP server.
- **Password:** Enter the password for connecting with the FTP server.
- **Confirm Password:** To confirm it, enter the password again.
- **Data Connection Mode:** Select Active or Passive (FTP only).
- **Additional Attributes:** Select the additional attributes you would like to publish for the event.

Configuration Settings for HTTP Post Alert Actions

The following settings are available when configuring HTTP Post Alert Actions:

The screenshot shows two sections of a configuration form:

- Event Action Configuration:**
 - Primary HTTP URL*: [Input field]
 - Secondary HTTP URL: [Input field]
 - SSL*: [Dropdown menu set to "Do not use SSL"]
 - HTTP Username: [Input field]
 - HTTP Password: [Input field showing masked text]
 - Confirm Password: [Input field showing masked text]
- Additional Event Information:**
 - Additional Attributes: [Table]

Name	[Input field]	...
Asset Location	[Input field]	
Description	[Input field]	

- **Primary HTTP URL:** Specify the URL that you would like to post the report to.
- **Secondary HTTP URL:** Input the hostname of the secondary server to post to (optional).
- **SSL:** Select if you would like to use SSL and if so, whether or not to require the SSL certificate of the host to be from a trusted authority.
- **HTTP Username:** This is the HTTP login username.
- **HTTP Password:** This is the HTTP login password.

- **Confirm Password:** Confirm the HTTP login password.
- **Additional Attributes:** Select the additional attributes you would like to publish for the event.

Configuration Settings for Logging Event Actions

The following settings are available when configuring Logging Event Actions:

Log Configuration

Log Entry Format*:	<input type="text" value="JSON"/>	...
Destination Directory*:	<input type="text" value="\${DATE}"/>	...
Destination File Name*:	<input type="text" value="\${DATE}_event.log"/>	...

Additional Event Information

Additional Attributes:	<input type="checkbox"/> Name <input type="checkbox"/> Asset Location <input type="checkbox"/> Description	...
------------------------	--	-----

- **Log Entry Format:** Select JSON or XML format.
- **Destination Directory:** Specify the destination directory you would like to use. Macros can be used to specify the directory.
- **Destination File Name:** Specify the file name where alert information will be saved. Macros can be used to specify the file name.
- **Additional Attributes:** Select the additional attributes you would like to publish for the event.

Log Configuration

Log Entry Format*:	<input type="text" value="JSON"/>	...
Destination Directory*:	<input type="text" value="\${DATE}"/>	...
Destination File Name*:	<input type="text" value="\${DATE}_event.log"/>	...

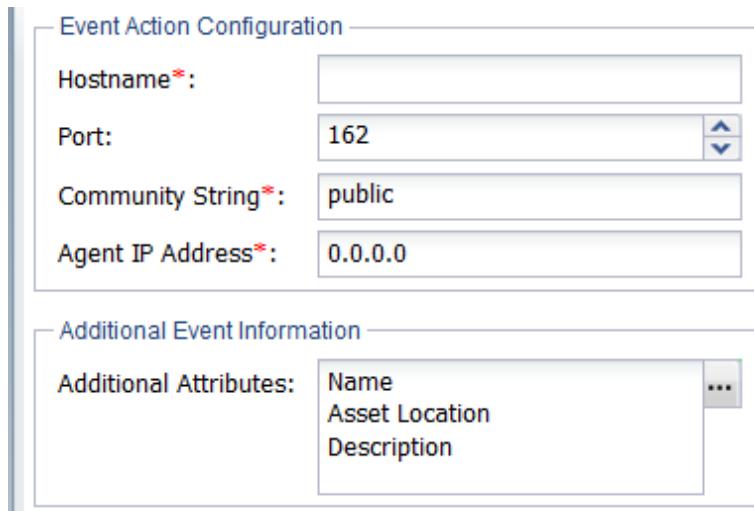
Additional Event Information

Additional Attributes:	<input type="checkbox"/> Name <input type="checkbox"/> Asset Location <input type="checkbox"/> Description	...
------------------------	--	-----

- **Log Entry Format:** Select JSON or XML format.
- **Destination Directory:** Specify the destination directory you would like to use. Macros can be used to specify the directory.
- **Destination File Name:** Specify the file name where alert information will be saved. Macros can be used to specify the file name.
- **Additional Attributes:** Select the additional attributes you would like to publish for the event.

For SNMP V1 Trap Event Actions

The configuration settings for SNMP V1 Event Actions are the following.



The screenshot shows a configuration form for "Event Action Configuration". It has two main sections: "Event Action Configuration" and "Additional Event Information".

- Event Action Configuration:**
 - Hostname*:** A text input field.
 - Port:** A dropdown menu set to "162".
 - Community String*:** A text input field containing "public".
 - Agent IP Address*:** A text input field containing "0.0.0.0".
- Additional Event Information:**
 - Additional Attributes:** A dropdown menu showing "Name", "Asset Location", and "Description".

NOTE: Asset Manager can send out-bound SNMP "traps" (alarms) to an external (third-party) management system; however, it does not support being polled by third-party applications with commands like snmpget or snmpwalk.

- **Hostname:** Specify the hostname of the server that the trap will be sent to.
- **Port:** Select the Port that the destination server is listening on (by default this is 162).
- **Community String:** Authentication of clients is performed by a community string, in effect a type of password, which is transmitted in cleartext. Input the community string for your server (by default this is set to "public")

xxx-yyy	DRAFT 133	7/2/2015
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- **Agent IP Address:** Input the IP address of your agent (a network-management software module that resides on a managed device).
- **Additional Attributes:** Select the additional attributes you would like to publish for the

For SNMP V3 Event Actions

The configuration settings for SNMP V3 Event Actions are the same as those for SNMP V1 Event Actions, with the addition of the following configuration settings:

Event Action Configuration

Transport Protocol*:	UDP
Hostname*:	
Port:	162
Type of Notification*:	TRAP
Authentication User ID*:	
Authentication Password:	*****
Confirm Password:	*****
Authentication Protocol*:	SHA-1

NOTE: Asset Manager can send out-bound SNMP "traps" (alarms) to an external (third-party) management system; however, it does not support being polled by third-party applications with commands like snmp-get or snmp-walk.

- **Transport Protocol:** Select UDP or TCP.
- **Hostname:** The hostname.
- **Port:** By default, 162.
- **Type of Notification:** Select TRAP or INFORM.
- **Authentication User ID/Password/Confirm:** Enter the user ID and password for your server

xxx-yyy	DRAFT 134	7/2/2015
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and confirm it.

- **Authentication Protocol:** Select None, SHA-1, or MD5 (by default this is set to SHA-1).

The screenshot shows two sections of a configuration form:

- Additional Event Information:** Contains a list of "Additional Attributes" with checkboxes: Name (checked), Asset Location, and Description. A "...>" button is to the right of the list.
- Advanced:** Contains fields for Engine ID, Context Engine ID, Context Name, Encryption Protocol (with a dropdown menu and a delete icon), Encryption Password, and Confirm Password. All password fields contain masked text.

- **Additional Attributes:** Select the additional attributes you would like to publish for the event.
- **Engine ID:** Within an administrative domain, an SNMP Engine ID is the unique and unambiguous identifier of an SNMP engine. Since there is a one-to-one association between SNMP engines and SNMP entities, it also uniquely and unambiguously identifies the SNMP entity.
Enter the SNMP Engine ID (if applicable).
- **Context Engine ID:** Within an administrative domain, a contextEngineID uniquely identifies an SNMP entity that may realize an instance of a context with a particular contextName.
Enter the SNMP Context Engine ID (if applicable).
- **Context Name:** A contextName is used to name a context. Each contextName MUST be unique within an SNMP entity. Enter a Context Name (if applicable).
- **Encryption Protocol:** Select None, DES, or AES-128 as encryption protocol.
- **Encryption Password/Confirm:** Enter the encryption password and confirm it.

NOTE: The RF Code MIB file can be found in the "mib" directory with the Asset Manager installation directory in Windows, or on the RF Code Support website: <http://support.rfcode.com/customer/portal/articles/716055>

Copying Event Actions

To copy an event action, perform the following steps:

1. Click the **Copy** button.

NOTE: By default, the Name of the new Event Action is “Copy of <Name of Action Copied>”

2. Enter or change any additional settings.
3. Click the **Save Changes** button.

Testing Event Actions

To test an event action, select an action from the list and then click the **Test** button.

NOTE: For trap actions (not inform actions) the **Test** button only tests that the Asset Manager system sent the trap. Administrators will need to verify at the target host in order to know if the trap was successfully received.

Deleting Event Actions

To delete an action, select an action from the list and then click the **Delete** button.

Event Triggers

For Events, the Triggers sub-task lets you create a triggering event(s) for the various event actions that have been configured for the Asset Manager system.

Creating New Triggers

To create a new Trigger, perform the following steps:

xxx-yyy	DRAFT 136	7/2/2015
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1. Navigate to **Events > Triggers**.

The Triggers task pane will appear on the right.



The Triggers task pane is divided into two sections: the list of defined triggers on the left and the Triggers Editor on the right. At the top of the task pane are several buttons: **New**, **Copy**, **Delete**, **New Folder**, **Edit Folder** and **Delete Folder**.

2. To create a folder, click the **New Folder** button.

A dialog box will appear.

3. Type in a name for the new folder and then click the **Create Folder** button.



To edit a folder, click the **Edit Folder** button.

To delete a folder, click the **Delete Folder** button.

xxx-yyy	DRAFT 137	7/2/2015
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4. Click **New** button and the Trigger Configuration Pane will appear.

Configuring Triggers

The following Trigger configuration settings are available:

Basic Information

The following Basic Information fields can be configured:

- **Name:** Name the trigger and select the Enabled checkbox to enable the trigger.
- **Trigger Schedule:** Click the ... button which will prompt a scheduling window. Disable and enable the days/times that you would like to schedule this trigger for. By default the trigger schedule is set to all days/times enabled. This means that, left in the default state, the trigger would occur at all times when the defined trigger conditions have been met. To disable certain days/times, select the day/time blocks you would like to disable and click the **Disable** button. Or select the **Disable All** button which will disable the trigger schedule for all days/times. To enable certain day/time slots, select the desired days/times and click the **Enable** button. To enable all day/time slots, click the **Enable All** button. Click the **OK** button to save the schedule or the **Cancel** button to cancel the schedule.

Event Filters

The following Event Filters can be configured:

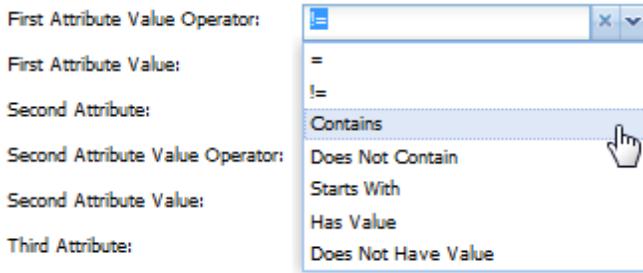
- **Trigger Filter Asset Type:** Select the entity root for your trigger from the tree. Only this entity and the entities under it will be able to trigger this event.
- **Trigger Attributes:** This is a list of attributes that will be monitored for changes. Any time the value for one of these attributes changes for any of the entities specified by the "Filter Asset Type" field, the Asset Manager system will check to see if the rest of the trigger conditions are met by the entity. If the conditions are met then the trigger executes the configured actions.
- **First Attribute:** Select an attribute that you would like to filter by.

xxx-yyy	DRAFT 138	7/2/2015
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- **First Attribute Value Operator:** Choose the operator for the attribute you have selected.

The following are possible Operator choices:

NOTE: Depending on the Attribute you select for the Trigger, the list of Operator choices may vary.



- **First Attribute Value:** Enter the value that will be compared to (if applicable based on the operator selected).
- **Second Attribute:** Select a second attribute you would like to filter by.
- **Second Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Second Attribute Value:** Enter the value that will be compared to (if applicable based on the operator selected).
- **Third Attribute:** Select a third attribute you would like to filter by.
- **Third Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Third Attribute Value:** Enter the value that will be compared to (if applicable based on the operator selected).
- **Trigger When Entering Filter:** Select this checkbox if you would like the trigger to initiate the configured actions when the attribute enters the state specified by the trigger configuration.
- **Trigger On Attribute Update:** Select this checkbox if you would like the trigger to initiate the configured actions when the attribute state updates.

- **Trigger When Exiting Filter:** Select this checkbox if you would like the trigger to initiate the action when the attribute exits the state specified by the trigger configuration.
- **Event Trigger Delay:** Enter a value here if you would like to delay the trigger by a nominal amount after the state specified has been achieved.
- **Event Actions:** Select the action(s) that you would like the trigger to initiate. The available actions are configured in the Actions sub-task. For more about Event Actions, refer to the [Configuring Event Actions](#) section.

Click the **Save Changes** button to save the settings.

Copying Event Triggers

To copy an event trigger, perform the following steps:

1. Click the **Copy** button.
By default the Name of the trigger is “Copy of <name of event copied>”
2. Change or enter any additional settings you want.
3. Click the **Save Changes** button to save the changes.

Deleting Event Triggers

To delete a trigger, select the appropriate trigger from the tree and then click the **Delete** button.

Alerts

Alerts are similar to Events, but have to be configured separately with Thresholds instead of with Triggers. For Alerts there is an Alert Viewer as well. Alerts can be configured by and for both Administrators and Users. The first three sub-tasks are available in both the Admin Console and the User Console, but in the Admin Console, there is also a Global Alert Policy sub-task.

xxx-yyy	DRAFT 140	7/2/2015
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Alerts have Actions much like Events do. The information available in Alert Actions is much the same as that available in Event Actions. Configuring Alert Alerts is also essentially the same as configuring Event Actions, although Alerts have Thresholds (while Events have Triggers).

NOTE: Email notifications about database connectivity are configured in the **Configuration** task under the **Database** sub-task.

Alert Viewer

The Alert Viewer is accessible as the first sub-task under Alert Management. However, the information that will be accessible within it will not be present until you have configured one or more Alert Actions based on at least one or more Thresholds.

The screenshot shows the Asset Manager: Alert Viewer interface. The left sidebar includes links for Dashboard, Tag Management, Customization, Assets, Access Control, Maps, Reports / Graphs, and Events. Under Events, there are sub-links for Alert Management, Alert Viewer, Actions, and Thresholds. The main area displays a table of alerts with columns: Type, Location, Status, Attribute, Operator, Value, Alert Start Time, Alert Resolve Time, and Alert Message. The alert table lists numerous entries, mostly 'Low Battery' alerts from various locations like 'RFC Data Center', 'RFC Rack 1', and 'M. Voth House - Ext.' with 'Warning' severity. The status for most alerts is 'Open'. The alert message column provides a detailed description of each alert condition. At the bottom of the page, there are navigation links for 'Logout | Link | About | Admin Console'.

This sub-task lets you view and manage alerts. When alert conditions are processed by Asset Manager, the alert details can be viewed by using this sub-task.

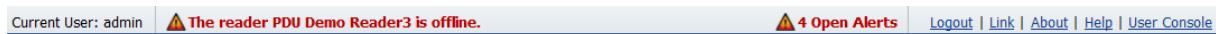
Alerts can be filtered using the Filter Bar. Alerts can be filtered by Type, Location, Status (Open, Closed), Attribute, Operator, Value.

This screenshot shows the same Alert Viewer interface as above, but with a different filter applied. The filter bar at the top has 'Type' set to 'Asset Alert', 'Location' set to 'All', and 'Status' set to 'Open'. The rest of the interface and data table are identical to the previous screenshot.

The Alert Viewer provides the following controls:

- **Pause/Resume Update:** By default, the Alert View will be continually updated in the browser. Use the Pause button to stop the alert view from updating. This is especially useful when there is a high-volume of alerts. Click Resume to enable real-time updates.
- **View:** Click the View button to view the details of a selected alert.
- **Acknowledge:** Click the Acknowledge button to acknowledge a selected alert. This option is only available for thresholds that have been configured with the “User Required to Acknowledge Alert” check box in the Alert Threshold sub-task.
- **Delete:** Click to delete the alert from the Asset Manager database.
- **Delete All Closed:** Clicking this button will delete all alerts that have been closed from the Asset Manager database.

Notification of system alerts also happens in the Alert field at the bottom of both the Admin Console and the User Console in the middle area between the Current User and the Logout link. The most recent alert and the number of open alerts will be visible in red.



You can then view these alerts in the Alert Viewer by navigating to it from the left pane of Tasks or by clicking on either the name of the most recent alert or on the notification of how many alerts there are open.

When you click the link, the Alert Viewer opens and shows details for all of the Open Alerts.

Alert Actions

Alert Actions are similar to Event Actions, except in addition to the six Event Actions available, you can also create and configure a Serial Device Send Alert Action.

xxx-yyy	DRAFT 142	7/2/2015
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Creating Alert Actions

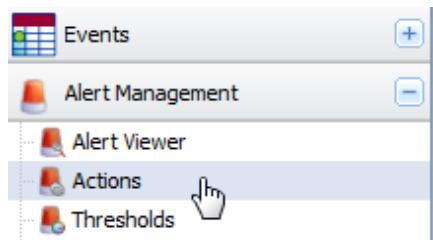
This sub-task lets you create automated responses to alert conditions.

The following alert actions are available:

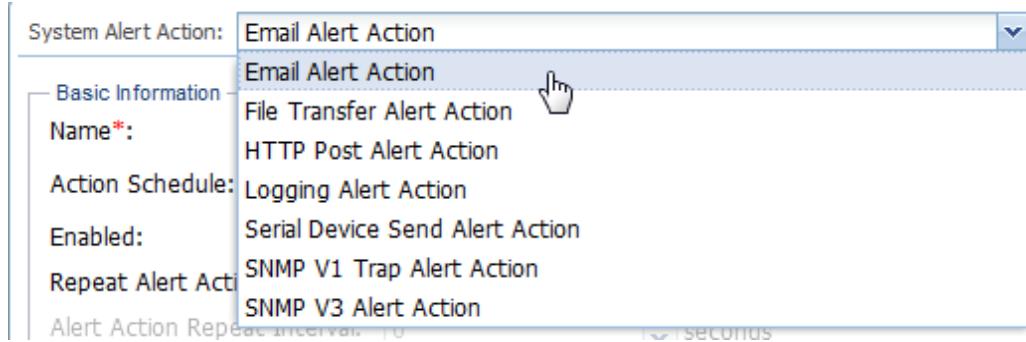
- Email Alert Action
- File Transfer Alert Action
- HTTP Post Alert Action
- Logging Alert Action
- Serial Device Send Alert Action
- SNMP V1 Trap Alert Action
- SNMP V3 Alert Action

To create an Alert Action, perform the following steps:

1. Select the **Alert Management** task.
2. Select the **Actions** sub-task.



3. Click **New** and then select an alert action from the drop-down list, or select a pre-existing action to edit.



4. The settings available in the action editor pane enable you to configure the alert action:

Configuring Alert Actions

Basic Information

The following fields comprise the Basic Information configuration settings for all Alert Actions:

- **Name:** Name the alert action and select the Enabled checkbox to enable the action.
- **Action Schedule:** Click the ... button which will prompt a scheduling window. Disable and enable the days/times that you would like to schedule this action for. By default the action schedule is set to "Always Active". This means that, left in the default state, the action will execute any time an associated alert threshold opens/closes. To disable certain days/times, select the day/ time blocks you would like to disable and click the **Disable** button. Or select the **Disable All** button which will disable the action schedule for all days/times. To enable certain day/time slots, select the desired days/times and click the **Enable** button. To enable all day/- time slots, click the **Enable All** button. Click the **OK** button to save the schedule or the **Cancel** button to cancel the schedule.
- **Repeat alert action:** Select this checkbox to allow the alert action to repeat.
- **Alert Action Repeat Interval:** Specify the number of seconds of the interval you would like for the alert action to repeat at.
- **Alert When Resolved:** Select this checkbox to enable a message to trigger a notice when the alert has been resolved.

xxx-yyy	DRAFT 144	7/2/2015
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Configuration Settings for Different Kinds of Alert Actions

Configuring Email Alert Actions

- **Email Address(es):** Specify a valid Email address.
- **Alert Action Message:** Define the message to be delivered in the alert.

NOTE: Macros can be used when configuring Alert Actions. For more information about Macros, refer to the [Using Macros](#) section in the Appendix.

NOTE: For FTP, HTTP, and Logging actions, the information that will be transmitted will be a combination of the following:

- The replaced values for all macros available to the action (see table above), with the exception of the following macros, which only output a partial date or time: DATE, YEAR, MONTH, DAY, TIME, HOUR, MINUTE, SECOND, MILLISECOND, TIMEZONE_OFFSET.
- Additional source attributes specified in the definition of the source alert.
- Other values for backwards compatibility of alert actions. All alert action name/value pairs from previous versions of HTTP and FTP alert actions are included and supported. Since some names do not match the macro name for the same value, the value is duplicated.

Configuring FTP Alert Actions

- **Transfer Protocol:** Select FTP or SFTP (Secure File Transfer Protocol).
- **Remote Directory:** Specify the remote directory path where the file will be saved. Macro values can be used to specify the directory.
- **File Name:** Specify the file name where alert information will be saved. Macros can be used to specify the file name.
- **Primary Host:** Input the hostname of the FTP server.

xxx-yyy	DRAFT 145	7/2/2015
---------	--------------	----------

- **Primary Port:** Select the Port over which to communicate with the FTP server (by default port 21 for FTP or 22 for SFTP).
- **Secondary Host:** Input the hostname of the secondary sever to post to if posting to the primary server is unsuccessful (optional).
- **Secondary Port:** Select the Port over which to communicate with the secondary FTP server.
- **Username/Password/Confirm:** Enter the username and password for your FTP server if you have one and confirm it.

Configuring HTTP Post Alert Actions

- **Primary HTTP URL:** Specify the URL that you would like to post the alert to.
- **Secondary HTTP URL:** Specify a secondary URL that you would like to post the alert to if posting to the primary server is unsuccessful.
- **SSL:** Select if you would like to use SSL.
- **HTTP Username/Password:** Specify the HTTP username and password if you plan to use one.
- **Additional Attributes:** Select any additional attributes you would like to post for the alert.

Configuring Logging Alert Actions

- **Log Entry Format:** Select either JSON or XML logging format.
- **Destination Directory:** Select the macro(s) for the directory to publish to.
- **Destination File Name:** Specify the file name where alert information will be saved.

NOTE: Macros can be used to specify file names. For more information on Macros, refer to the [Macros](#) section.

xxx-yyy	DRAFT 146	7/2/2015
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Configuring SNMP V1 Trap Alert Actions

- **Hostname:** Specify the hostname of the server the trap will be sent to.
- **Port:** Select the port that the destination server is listening on (by default this is 162).
- **Community String:** Authentication of clients is performed by a community string, in effect a type of password, which is transmitted in clear text. Input the community string for your server (by default this is set to "public").
- **Agent IP Address:** Input the IP address of your agent (a network-management software module that resides on a managed device).
- **Additional Attributes:** Select any additional attributes you would like to publish for the alert.

NOTE: For more about SNMP trap formatting, refer to the [SNMP Trap Formatting](#) section.

Configuring SNMP V3 Alert Actions

- **Transport Protocol:** Select UDP or TCP.
- **Hostname:** Input the IP address of your server.
- **Port:** Select the Port over which to communicate with the server (by default this is 162).
- **Type of Notification:** Select TRAP or INFORM.
- **Authentication User ID/Password/Confirm:** Enter the user ID and password for your server if you have one and confirm it.
- **Authentication Protocol:** Select None, SHA-1, or MD5 (by default this is set to SHA-1).
- **Additional Attributes:** Select the additional attributes you would like to publish for the event.
- **Engine ID:** Within an administrative domain, an SNMP Engine ID is the unique and unambiguous identifier of an SNMP engine. Since there is a one-to-one association between SNMP engines and SNMP entities, it also uniquely and unambiguously identifies the SNMP entity. Enter the SNMP Engine ID (if applicable).

xxx-yyy	DRAFT 147	7/2/2015
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- **Context Engine ID:** Within an administrative domain, a contextEngineID uniquely identifies an SNMP entity that may realize an instance of a context with a particular contextName. Enter the SNMP Context Engine ID (if applicable).
- **Context Name:** A contextName is used to name a context. Each contextName MUST be unique within an SNMP entity. Enter a Context Name (if applicable).
- **Encryption Protocol:** Select None, DES, or AES-128 as encryption protocol.
- **Encryption Password/Confirm:** Enter the encryption password and confirm it.

NOTE: For more about SNMP trap formatting, refer to the [SNMP Trap Formatting](#) section.

NOTE: The RF Code MIB file can be found in the "mib" directory under Asset Manager's installation directory.

Configuring Serial Device Send Alert Actions

The configuration settings specific to Serial Device Send Alerts are the following:

NOTE: Serial Device Send Alerts are Actions available for Alerts but not for Events.

- **Serial Device List:** Choose a serial device to send an alert to.
- **Serial Message on Open:** Input a message to send when an alert is opened.
- **Serial Message on Resolve:** Input a message to send when alert is resolved.

Copying Alert Actions

To copy an action, perform the following steps:

1. Click the **Copy** button.

By default, the name of the Action is “Copy of <name of the action copied>”

xxx-yyy	DRAFT 148	7/2/2015
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2. Enter or modify the Name and any other settings.
3. Click the **Save Changes** button.

Testing Alert Actions

To test an action, choose an Action from the list of available Actions and then click the **Test** button.

NOTE: For trap actions (vs. Actions that delivery information), the **Test** button only tests that the Asset Manager system sent the trap. You will need to go to the target host in order to verify that the trap was successfully sent and received.

Deleting Alert Actions

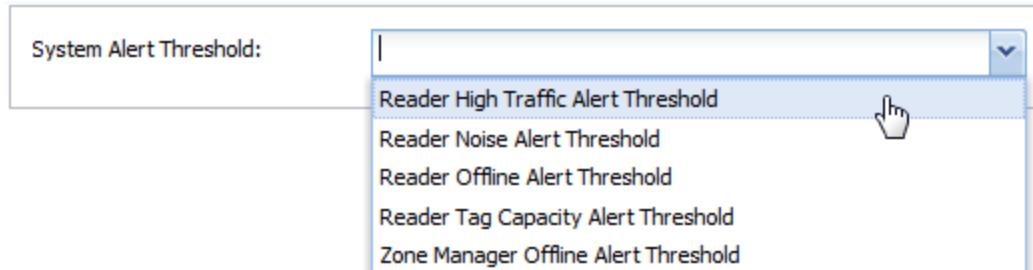
To delete an action, choose an Action from the list of available Actions and then click the **Delete** button.

Alert Thresholds

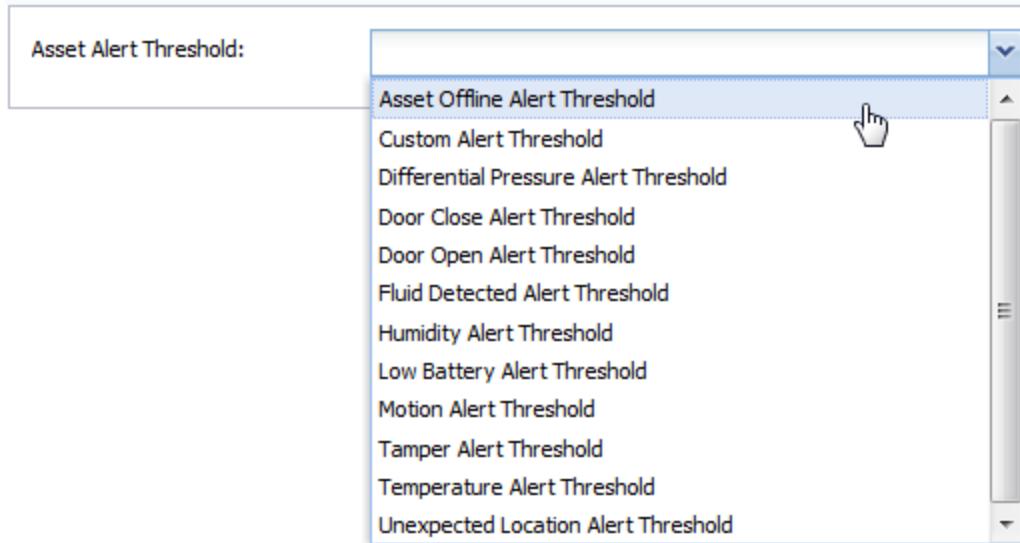
This sub-task allows you to set specific conditions (thresholds) upon which alerts are created. Alert Thresholds are configured in both the Admin Console and in the User Console. The options available are different in each Console.

System Alert Thresholds are created in the Admin Console. Asset Alert Thresholds are created in the User Console.

You can create any of the following System Alert Thresholds from the Admin Console:



From the User Console, you can create any of the following Alert Thresholds:



Creating Alert Thresholds

To create and configure an Alert Threshold, perform the following steps:

1. Navigate to **Alert Management > Thresholds**.

The Threshold task pane will appear on the right with a default viewing showing a list of any Thresholds that have already been created (if any) and a Thresholds Editor on the right, that defaults to the System Alert Threshold drop-down menu, but which populates with fields and settings specific to the Threshold you choose from the list or pick from the drop-down menu.

At the top of the task pane are several buttons: **New**, **Copy**, **Delete**, **New Folder**, **Edit Folder** and **Delete Folder**.



2. To create a folder, click the **New Folder** button.

A dialog box will appear.

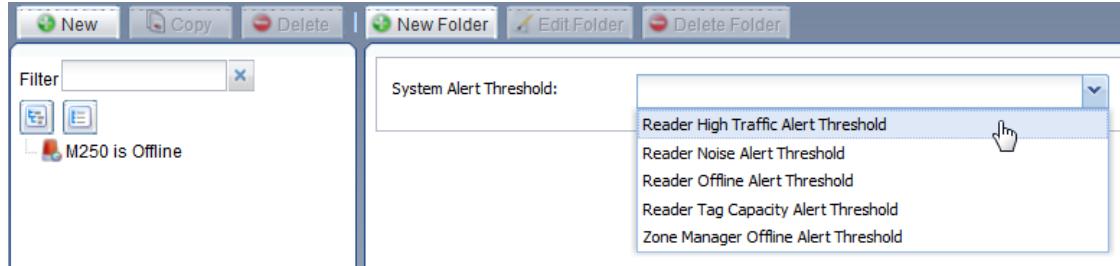
xxx-yyy	DRAFT 150	7/2/2015
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3. Type in a name for the new folder and then click the **Create Folder** button.

NOTE: To edit a folder, highlight the folder from the hierarchy in the middle pane and then click the **Edit Folder** button, or, to delete a folder, highlight it and then click the **Delete Folder** button.

4. To create a new Threshold, click the **New** button.
5. Select an Alert Threshold from the drop-down list.



The configuration fields and settings for the Threshold then appear in the right pane.

Configuring Alert Thresholds

The following areas and settings are available for configuring Thresholds:

Basic Information

The following fields comprise the Basic Information configuration settings for Thresholds:

- **Name:** The name of the Threshold.
- **Threshold Schedule:** Click the Ellipsis [...] button to open a scheduling window.

~~Disable and enable the days/times that you would like to schedule this threshold for. By~~

xxx-yyy	DRAFT 151	7/2/2015
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default the threshold schedule is set to "Always Active". This means that, left in the default state, the threshold will open and close alert any time the alert conditions are met. To disable certain days/times, select the day/ time blocks you would like to disable and click the **Disable** button. Or select the **Disable All** button which will disable the threshold schedule for all days/times. To enable certain day/time slots, select the desired days/times and click the **Enable** button. To enable all day/time slots, click the **Enable All** button. Click the **OK** button to save the schedule or the **Cancel** button to cancel the schedule.

- **Enabled:** To enable an Alert Threshold, you must check this checkbox.

- **Alert Severity:** The severity level for an alert.

In order of most severe to least severe, the severities are Failure, Critical, Error, Warning, and Informational.

- **User Required to Acknowledge Alert:** When checked, this checkbox requires that the alert be acknowledged before it is considered closed.

Alert Filter

The following fields comprise the Alert Filter configuration settings for Thresholds:

NOTE: Changing a filter for an existing threshold will resolve any open alerts generated by the previous filter definition of the threshold.

- **Threshold Filter Asset Type:** The asset type is configured for you based on the type of system alert threshold you have selected.
- **First Attribute:** The first attribute is configured for you based on the type of system alert threshold you have selected.
- **First Attribute Value Operator:** The value operator is configured for you based on the type of system alert threshold you have selected.
- **First Attribute Value:** The value is configured for you based on the type of system alert threshold you have selected.

xxx-yyy	DRAFT 152	7/2/2015
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- **Second Attribute:** Choose a second attribute you would like to filter by.
- **Second Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Second Attribute Value:** Enter the value that will be compared to (if applicable based on the operator selected).
- **Third Attribute:** Choose a third attribute you would like to filter by.
- **Third Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Third Attribute Value:** Enter the value that will be compared to (if applicable based on the operator selected).
- **Threshold Delay:** Enter a value here if you would like to delay a period of time before triggering an alert once the conditions have been met.

Copying Alert Thresholds

A copy of a Threshold can be made so that a user can quickly build a new Threshold based on an existing one.

To copy a Threshold, perform the following steps:

1. Click the **Copy** button.
2. Change or enter any additional settings.

NOTE: By default, the Name of a Threshold is “Copy of <name of alert copied>”

3. Click the **Save Changes** button.

Deleting Alert Thresholds

To delete a Threshold, select the appropriate Threshold from the tree and then click the **Delete** button.

xxx-yyy	DRAFT 153	7/2/2015
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Global Alert Policies for Alert Actions and Thresholds

This sub-task lets you manipulate Alert Actions and Thresholds globally for the entire Asset Manager system. There are three Global Alert Policy settings that can be set:

- **Active:** when this setting is chosen, all alert actions and thresholds that have been configured in the Asset Manager system will be active and perform as configured.
- **Suspend Alert Actions:** when this setting is selected, all alert actions will be suspended until the “Active” global alert policy is re-selected. This will suspend all alert actions from being triggered until the setting is returned to “Active.”
- **Suspend Thresholds & Alert Actions:** when this setting is selected, all configured thresholds and alert actions will be suspended until the “Active” (or if Suspend Alert Actions is set, Threshold will be restored globally) global alert policy is re-selected. This stops thresholds in the system from functioning or alerts from happening. When the Active setting is restored, the thresholds and alert actions that occur from that moment on, will resume.

How to Set Up Some Specific Alerts

The following instructions are useful when configuring some specific kinds of alerts.

How to Set Up a Serial Asset Alert

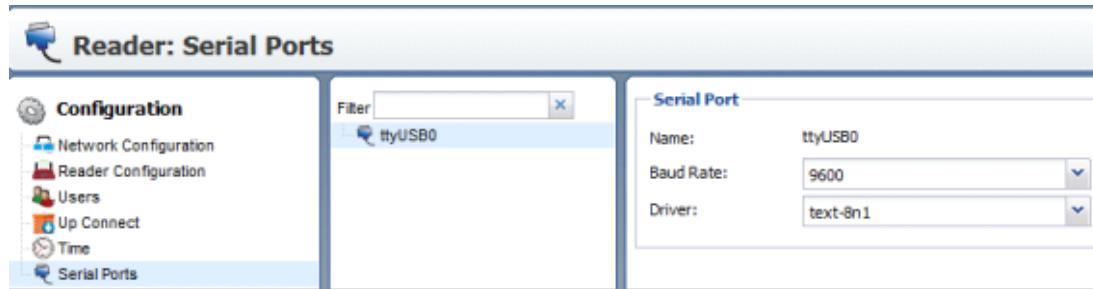
To set up a Serial Alert Action, perform the following steps:

1. Connect the serial device to the reader using a USB-to-RS232 (USB-to-serial) converter.

xxx-yyy	DRAFT 154	7/2/2015
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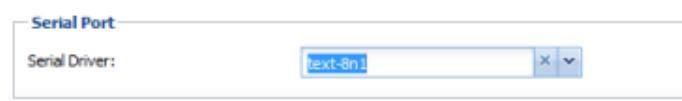
NOTE: A female/female (F/F) gender changer may be required to connect the cable.

2. Use the web interface to the reader, and set the Serial Port to the following:



NOTE: The baud rate and driver setting depends on the hardware to be connected.

3. In the **Admin Console** browse to **Configuration > Readers**
4. Select the reader to be configured
5. Set the Serial Driver for the Serial Port to **text-8n1**.



6. Then, in the **User Console**, go to **Alert Management > Actions**
7. Set up a new Alert Action for the serial device:

The following command strings are used to communicate with serial interface converter-controllers, that is, output relays (for example, Patlite PHC-100 Relays Panels):

- :toser,@??101! (Relay 1)
- :toser,@??102! (Relay 2)
- :toser,@??103! (Relays 1&2)
- :toser,@??104! (Relay 3)

etc....

- :toser,@??001! (Relay 1 off)

Patlite RS-232C Commands

The commands below can be used when configuring Serial Action Alerts with the Patlite RS-232C.

NOTE: Multiple commands **must** be separated by a space each.

:toser,@??120!	red light blink
:toser,@??001!	red light off
:toser,@??101!	red light solid
:toser,@??102!	yellow solid
:toser,@??103!	yellow & red solid
:toser,@??104!	green solid
:toser,@??105!	red & green solid
:toser,@??106!	yellow & green solid
:toser,@??107!	yellow & green & red solid
:toser,@??108!	fast beep
:toser,@??110!	slow seep
:toser,@??120!	red blink
:toser,@??130!	red blink & slow beep
:toser,@??140!	yellow blink
:toser,@??150!	yellow blink & slow beep
:toser,@??160!	red blink & yellow blink
:toser,@??170!	red blink & yellow blink & slow beep
:toser,@??180!	green blink

:toser,@??117!	yellow & green & red solid & slow beep
:toser,@??0??!	Turns ALL lights and sounds OFF

Asset Alert Action: Serial Device Send Alert Action

Basic Information

Name*: Jim's Alert Action 1
Action Schedule: Always Active <input type="button" value="..."/>
Enabled: <input type="checkbox"/>
Repeat Alert Action: <input checked="" type="checkbox"/>
Alert Action Repeat Interval: 10 <input type="button" value="^"/> <input type="button" value="v"/> seconds
Alert When Resolved: <input checked="" type="checkbox"/>

Alert Action Configuration

Serial Device List*: RFC Reader - Jim's Cube - Serial <input type="button" value="..."/>
Serial Message on Open: :toser,@??001! :toser,@??180!
Serial Message on Resolve: :toser,@??0??!

The example to the left has Serial Message on Open set to:

:toser,@??001! :toser,@??180!

:toser,@??001! – is used to turn the red light off

(and is required to get any non-red lights to illuminate)

:toser,@??180! – is used to set the green light to blink

Serial Message on Resolve is set to:

:toser,@??0??!

This command turns all sounds and lights OFF.

How to Set Up a Humidity Alert Email for Existing Temperature and/or Humidity Tags

To set up a humidity alert email for an existing temperature and/or humidity tag, perform the following steps:

1. In **User Console**, click on the **Alert Management** tab in the left-hand column.
2. Click on the **Thresholds** tab.
3. In the **Asset Alert Threshold** window, choose **Humidity Alert Threshold** from the drop-down menu.
4. Complete the relevant form fields.

Name: Humidity Alert Threshold

Threshold Filter Asset Type: Sensor (would cover all sensor tags).

First Attribute Value Operator: “>=” or “>” are logical choices.

First Attribute Value: “45” or your numerical preference (this is the Relative Humidity (RH) percentage value).

5. Click the **Save Changes** button.

xxx-yyy	DRAFT 158	7/2/2015
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6. Click Actions.
7. In the **Asset Alert Action** window, select **Email Alert Action** from the drop-down menu.

8. Complete the relevant form fields.

Name: Email John Doe.

Email Address(es): jdoe@yourcompany.com

NOTE: There are other fields you can complete to enable other features, but they are not required for simple email alerts.

Repeat Alert Action: to repeat the email alert

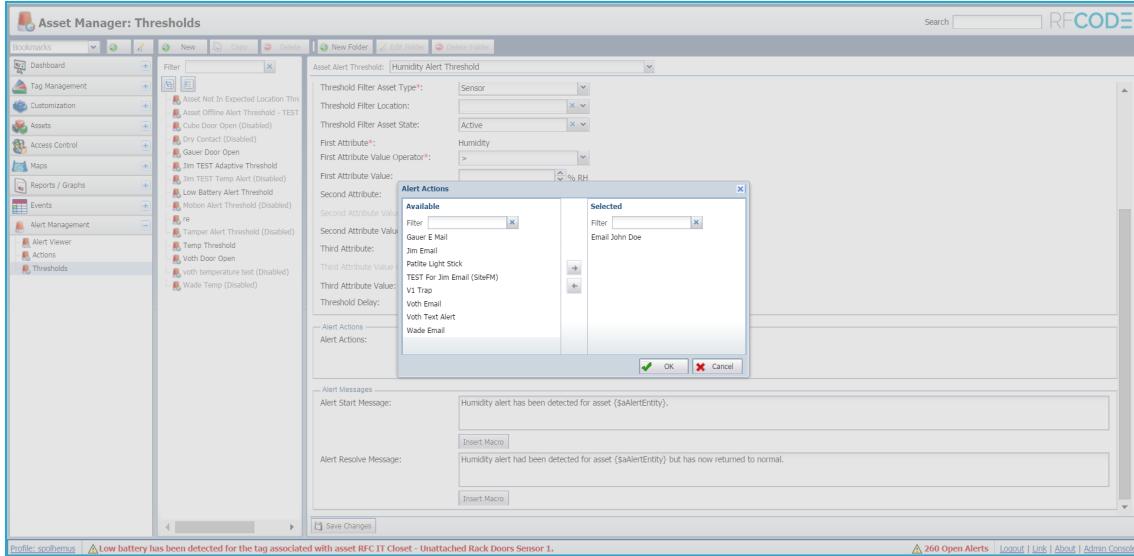
Alert Action Repeat Interval: to choose the time interval you want the alert email to be repeatedly sent using

Alert When Resolved: to inform you when the alert is resolved

1. Click the **Save Changes** button.
2. Click on the **Thresholds** tab under **Alert Management**.
3. In the **Asset Alert Threshold** window, choose **Humidity Alert Threshold** from the drop-down menu.

xxx-yyy	DRAFT 159	7/2/2015
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4. Scroll down to the **Alert Actions** field and then click the Ellipsis [...] button.



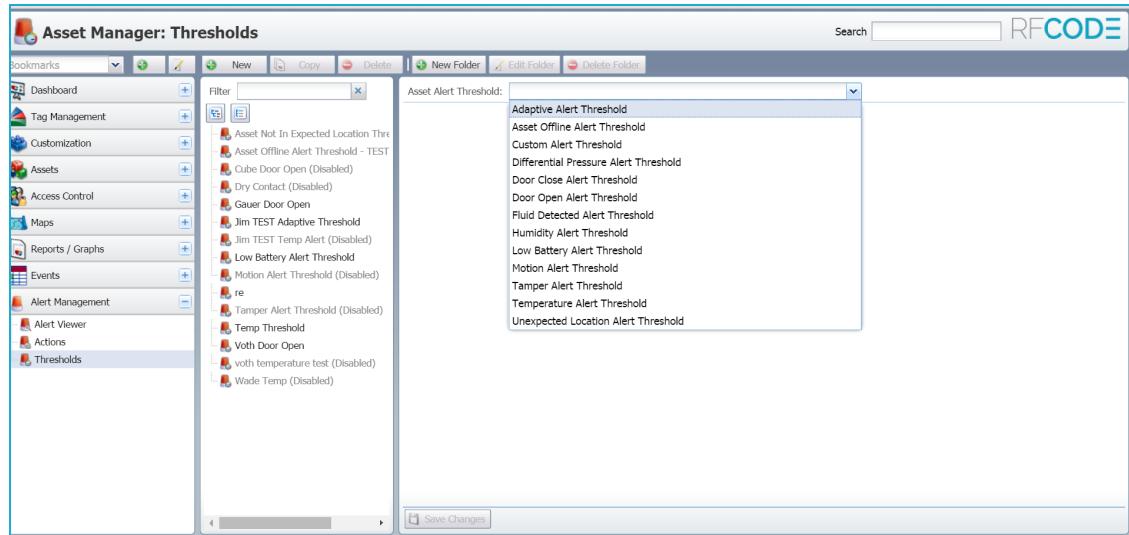
5. Double-click the alert on the left side under **Available** and it will move to the right side under **Selected**.
 6. Click the **OK** button.
- The **Action** will then be available in the **Alert Actions** field.
7. Click the **Save Changes** button.

How to Set Up an Offline Asset Alert

To set up an Offline Asset alert email for an existing asset tag, perform the following steps:

1. In the **User Console**, click the **Alert Management** tab in the left column.
2. Click the **Thresholds** tab.
3. In the **Asset Alert Threshold** window, choose **Asset Offline Alert Threshold** from the drop-down menu.

xxx-yyy	DRAFT 160	7/2/2015
---------	--------------	----------



- Complete the relevant form fields.

Name: Asset Offline Alert Threshold

Threshold Filter Asset Type: Asset (would cover all tags—if you prefer, you can be more specific on the type)

Threshold Delay: 60 or 120 seconds (this can potentially cut down on false alarms by a missed beacon, for instance)

This screenshot shows the 'Asset Manager: Thresholds' configuration window for 'Asset Offline Alert Threshold'. The 'Basic Information' section includes fields for Name (Asset Offline Alert Threshold), Threshold Schedule (Always Active), Enabled (checked), Alert Severity (Warning), and User Required To Acknowledge Alert (unchecked). The 'Security' section shows Execution User Account set to admin. The 'Alert Filter' section defines the filter type as Asset, location as Active, and asset state as Active. It specifies an Online Status attribute with an equals operator and a value of No. The 'Threshold Delay' field is set to 120 seconds. The 'Alert Actions' section contains a placeholder for alert actions. At the bottom, there is a 'Save Changes' button.

- Click the **Save Changes** button at the bottom left of the **Asset Alert Threshold** window.

6. Click the **Actions** tab under **Alert Management**.
7. In the **Asset Alert Action** window, choose **Email Alert Action** from the drop-down menu.

You will then see the following screen:

The screenshot shows the 'Asset Manager: Actions' interface. On the left, there's a sidebar with various management tabs like Dashboard, Tag Management, Assets, Access Control, Reports / Graphs, Events, Alert Management, Alert Viewer, Actions, and Thresholds. The 'Actions' tab is selected. The main area is titled 'Asset Alert Action: Email Alert Action'. It has several sections: 'Basic Information' (Name: 'Email John Doe', Action Schedule: 'Always Active', Enabled: checked), 'Repeat Alert Action' (checkbox checked), 'Alert Action Repeat Interval' (set to 0 seconds), 'Alert When Resolved' (checkbox checked). Below that is 'Alert Action Configuration' with fields for 'Email Address(es)' (containing 'jdoe@yourcompany.com') and 'Email Subject Line' (set to 'Use Default'). At the bottom, there's a large text area for 'Alert Action Message' containing alert source and state information. At the very bottom, there's a 'Save Changes' button.

8. Complete the relevant form fields.

Name: Email John Doe

Email Address(es): jdoe@yourcompany.com

NOTE: The other fields are optional.

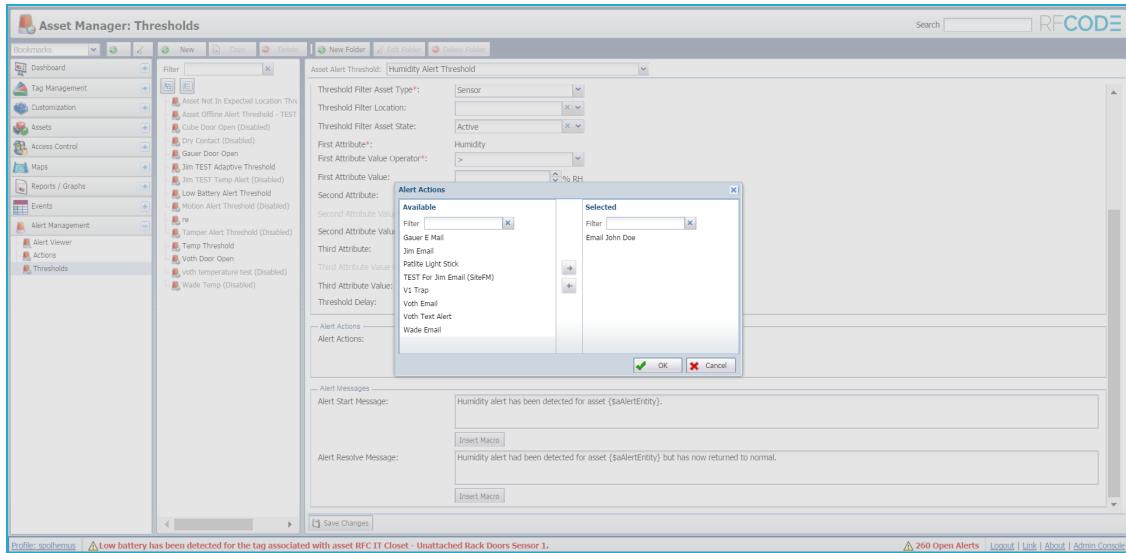
Repeat Alert Action: to repeat the email alert

Alert Action Repeat Interval: to choose the time interval you want the alert email to be repeatedly sent using

Alert When Resolved: to inform you when the alert is resolved

1. Click the **Save Changes** button.
2. Click the **Thresholds** tab under **Alert Management**.
3. In the **Asset Alert Threshold** window, choose **Asset Offline Alert Threshold** from the drop-down menu.

4. Scroll down to the **Alert Actions** field and click the Ellipsis [...] button.



5. Double-click the alert to move it from **Available** to the **Selected**.
6. Click the **OK** button. The **Action** appears in the **Alert Actions** field.

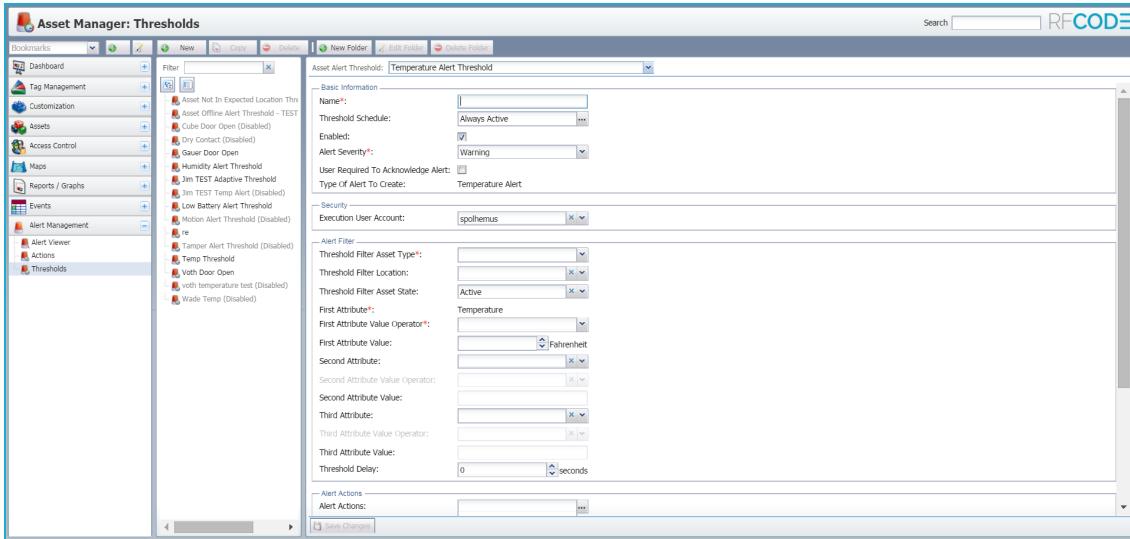
How to Set Up a Temperature Alert

Thresholds are limits for specific attribute values. Alerts are notifications you will receive if the value of a particular attribute goes beyond the threshold set for it. For example, you can set a threshold for a sensor tag's temperature reading to be 80° F and have an alert sent when the temperature exceeds this threshold.

To configure a basic threshold and alert, perform the following steps:

1. In the **User Console**, go to **Alert Management**.
2. Click **Actions** and then click the **New** button.
3. Choose **Email Alert Action** from the drop-down menu.
4. Give the alert a name and enter the email address of the alert recipient.
5. Click **Save Changes**.

6. Select **Temperature Alert Threshold** from the drop-down list.
7. Give the alert threshold a **Name**, for example, “Rack too hot”
8. In the **Alert Condition** section, set the **Threshold** Attribute Value Operator for example, **Greater Than (>)**
9. Set the **Threshold Attribute Value**, for example, **80**.



10. Set the **Alert Filter** so that all temperature sensors in the **RFC Data Center** are monitored.
This is a convenient way of setting a threshold on multiple sensors at one time for a given location, which let you receive an alert any time a sensor reads a temperature that is greater than the threshold you set.
11. Pick the **Email Frank** Alert Action.
An email like the one below will be sent to Frank when any temperature sensor in a particular data center location (for example, RFC Data Center) reads greater than 80 degrees.

From: noreply@rfcode.com
To: Frank
Cc:
Subject: Alert Started: Row 1 - Temp + Humidity, Threshold: Rack too hot

Alert Source: Row 1 - Temp + Humidity
Alert State: Open
Alert Severity: Warning
Alert Start Time: 4:11:18 PM CST

Alert Description: Temperature alert has been detected for asset Row 1 - Temp + Humidity.
Temperature: 81.5 Fahrenheit

Additional Alert Source Information:

Asset Location: RFC Row 1
Description: Temp & Humidity Sensor Tag for Row in RFC Data Center
Name: Row 1 - Temp + Humidity
Temperature: 81.5 Fahrenheit

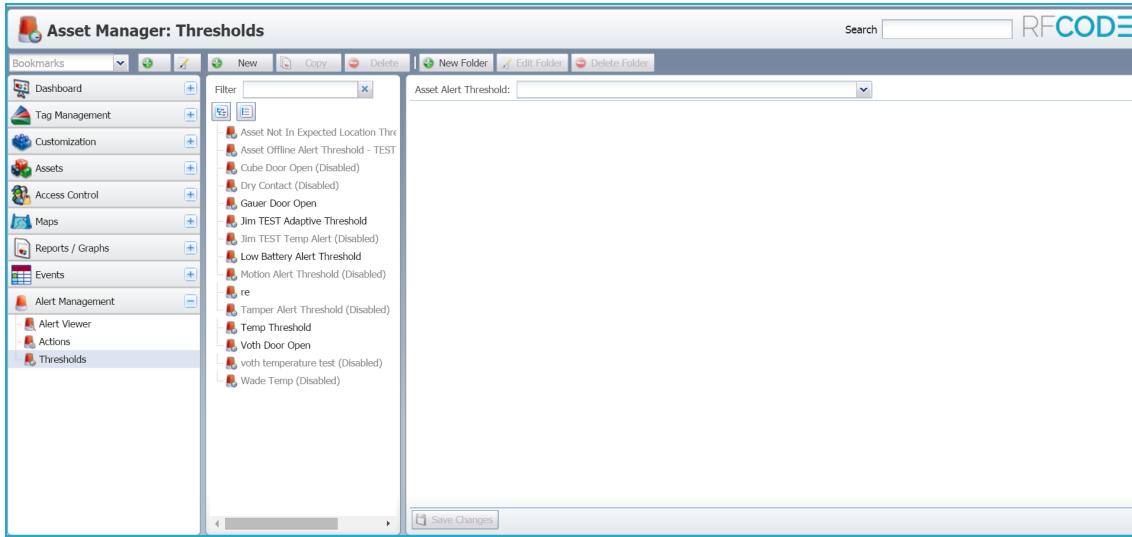
To view or manage the alert visit:
<http://AM:6580/user.jsp#view=user-alert-view>

NOTE: Alert thresholds and email notifications can be set up for other sensors such as humidity, fluid detection, and/or open door states.

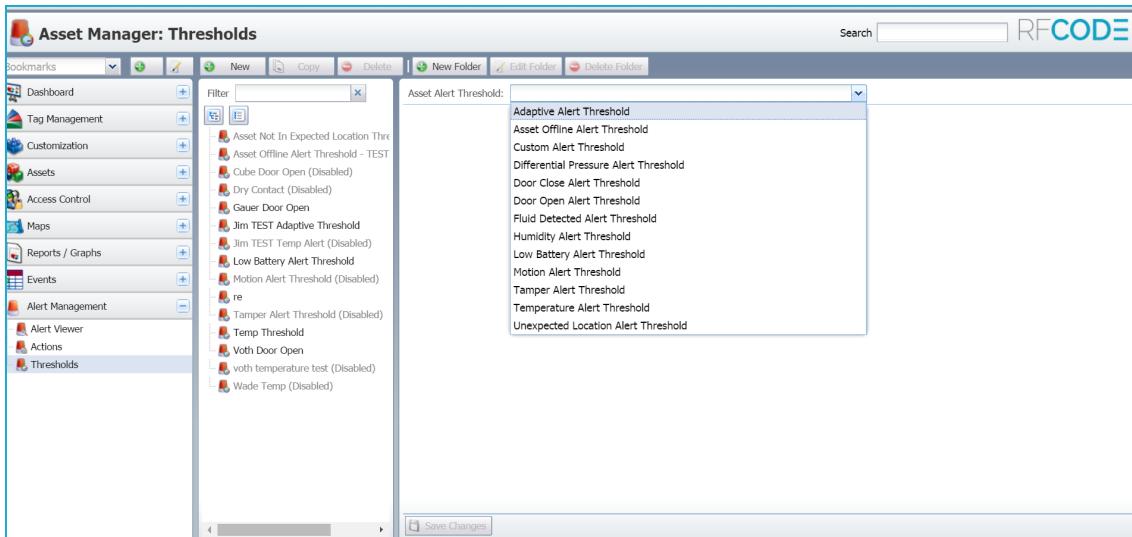
How to Set Up an Asset Online Alert

To set up a threshold alert to generate a notification when an asset comes online, perform the following steps:

1. Navigate to **User Console > Alert Management > Thresholds**.

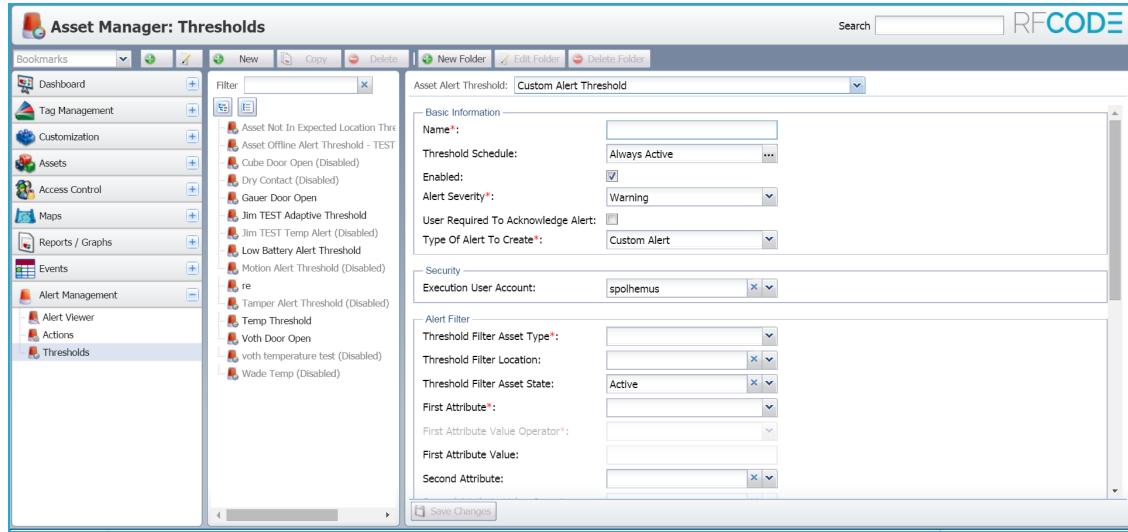


2. Click the New button.
3. In the right pane, click the drop-down menu for **Asset Alert Threshold**.



4. From the drop-down menu choose **Custom Alert Threshold**.

5. Complete all required and any desired additional fields to configure the Asset Alert Threshold.



Basic Information

Name: User-defined, but probably best to include the name of the Asset or the tag ID or both.

Enabled: Check the box if it is not already checked.

Alert Severity: The default is **Warning**, but you can select any of the other choices that you desire.

User Required To Acknowledge Alert: Again, this is up to the user to choose if they want to have to acknowledge alerts.

Alert Filter

- **Threshold Filter Asset Type:** Selecting **Asset** will include all tags/assets.
- **Threshold Filter Location:** Leave **BLANK** to search all locations.
- **First Attribute:** Choose **Online Status** from the drop-down menu.
- **First Attribute Value Operator:** Choose the **equal sign (=)** from the drop-down menu.
- **First Attribute Value:** Check the box.
- **Second Attribute:** Choose **Asset Tag** from the drop-down menu.

- Second Attribute Value Operator:** Choose the **equal sign (=)** from the drop-down menu.
- Second Attribute Value:** Enter the **tag ID** of the tag/asset you want to watch for (examples: **LOCATE00008398**, **RCKIRC000856498**, etc.).

Alert Actions

NOTE: Be sure to add all the Alert Actions that you want in order to make sure you receive the notifications you want to receive.

For the example, the Action “**Jon Doe Email**” was used.

Alert Messages

Alert Start Message: User-defined to say whatever you want it to say. Example: “An online alert condition has been detected for the asset {\$aAlertEntity}.”

Alert Resolve Message: User-defined to say whatever you want it to say. Example: “An online alert condition was detected for the asset {\$aAlertEntity}.”

When you are done, click the **Save Changes** button.

Below are two screenshots of the example with the form fields completed.

The screenshot shows a configuration interface for an alert threshold. The 'Security' section includes an 'Execution User Account' set to 'admin'. The 'Alert Filter' section contains the following settings:

- Threshold Filter Asset Type:** Asset
- Threshold Filter Location:** Universe
- Threshold Filter Asset State:** Active
- First Attribute:** Online Status
- First Attribute Value Operator:** =
- First Attribute Value:** checked
- Second Attribute:** Asset Tag
- Second Attribute Value Operator:** =
- Second Attribute Value:** LOCATE00180638
- Third Attribute:** (empty)
- Third Attribute Value Operator:** (empty)
- Third Attribute Value:** (empty)
- Threshold Delay:** 0 seconds

The 'Alert Actions' section is empty. At the bottom is a 'Save Changes' button.

Asset Alert Threshold: Custom Alert Threshold

Second Attribute Value:	LOCATE00180638
Third Attribute:	<input type="button" value="x"/>
Third Attribute Value Operator:	<input type="button" value="x"/>
Third Attribute Value:	
Threshold Delay:	0 <input type="button" value="^"/> seconds
Alert Actions	
Alert Actions:	Email John Doe <input type="button" value="..."/>
Alert Messages	
Alert Start Message:	An Online alert condition has been detected for the asset (\$aAlertEntity). <input type="button" value="Insert Macro"/>
Alert Resolve Message:	An Online alert condition was detected for the asset (\$aAlertEntity). <input type="button" value="Insert Macro"/>
<input type="button" value="Save Changes"/>	

Reports and Graphs

Reports provide summary and tabular data about assets and attributes, system users, and the system itself. Tabular reports are reports in spreadsheet format with columns of attributes and rows of data, while summary reports are counts and simple aggregates of data, such as the number of server assets or the average daily temperature in a given location. Graphs display information about reader states, reader noise levels, Zone Manager states, asset conditions, or environmental conditions in a visual fashion. Reports and graphs can be scheduled to run automatically, and be configured for automatic delivery by email, FTP, or HTTP post.

The screenshot shows the 'Asset Manager Administration: Manage Reports' screen. The top navigation bar includes 'Bookmarks', 'New', 'Copy', and 'Delete' buttons. On the left, a sidebar lists various management tasks: Dashboard, Configuration, Integration, Locations / Rules / Maps, Data Schema, Security, Reports / Graphs, Manage Reports, Reports, Manage Graphs, Graphs, Actions, and BIRT Templates. The 'Reports / Graphs' task is currently selected. The main panel contains a 'Filter' input field and a list of items under 'Manage Reports'.

Reports and Graphs Overview

The Reports and Graphs task is available in both the Admin Console and the User Console. From the User Console, reports and graphs relevant to managed assets and environmental monitoring can be created or managed. System reports and graphs are created and managed in the Admin Console.

The screenshot shows the 'Asset Manager: Manage Graphs' screen. The top navigation bar includes 'Search' and 'RF CODE' branding. The left sidebar lists tasks: Dashboard, Tag Management, Customization, Assets, Access Control, Maps, Reports / Graphs (with sub-options: Manage Reports, Reports, Manage Graphs, Graphs, Actions, BIRT Templates), Events, and Alert Management. The 'Manage Graphs' option is selected. The main panel displays a tree view of graph structures, including 'low batteries', 'MATT TEMP', 'malts', 'MJS Graph', 'Server Room Temp Graph', 'Site 1' (containing 'TCSolutions Humidity Graph. Last H', 'TCSolutions Temp Graph. Last Hour', 'temp 1', 'TEST2', 'tim', and 'Wade Temp Graph'), and other entries like 'TEST1' and 'TEST3'. A 'Save Changes' button is at the bottom.

The Reports/Graphs task includes six sub-tasks:

xxx-yyy	DRAFT 170	7/2/2015
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- **Manage Reports:** Create report criteria and then run reports either by manual selection or schedule. Once a report is created and executed, the result of the report is available in Reports.
- **Reports:** View the progress of reports that are running and access the data of reports that are complete. Completed reports can be viewed immediately or exported in XML, CSV, PDF, or SQLite formats.
- **Manage Graphs:** Create graph criteria and run graphs by manual selection or schedule. Once a graph is created and run, the result is available in Graphs.
- **Graphs:** View the progress of graphs that are running and access the data of graphs that are complete. Completed graphs can be viewed immediately or exported in PNG format.
- **Actions:** Deliver a report or graph to one or more recipients when the report or graph is run either on a schedule or interactively from the user interface. You can select from three protocols when creating Actions: Email, HTTP Post, and FTP. Once an action is defined, it can be assigned to a report or graph. Any number of actions can be assigned to an individual report or graph and any number of reports or graphs can share the same Actions.
- **BIRT Templates:** Upload and configure BIRT templates. Business Intelligence and Reporting Tools (BIRT™) is an open-source report generation tool developed by the Eclipse™ Foundation. You can create reports in the BIRT Designer and then add them to Asset Manager where the report will be executed. The BIRT module enables a rich variety of features, such as custom formatting, charts, data grouping and logos. You can even include data from multiple reports and external data sources to create reports tailored to your specific needs.

Reports

Asset Manager Reports are first created and then run. The Manage Reports task lets you create report definitions (templates) that can be run manually by users or automatically based on a schedule you define.

xxx-yyy	DRAFT 171	7/2/2015
---------	--------------	----------

Manage Reports

The Manage Reports task lets you create Reports based on specific criteria. Asset Manager provides several predefined reports you can use and customize. In addition, you can create Consolidated Reports which let you run multiple reports simultaneously so that they can be viewed or exported as a group.

Reports in Asset Manager are created in a tabular style that produces a table output of multiple rows and columns based on the report criteria specified.

Report Output - Reader Noise Report - 2013-04-09 12:54:38				
Start Time	Stop Time	Name	Noise Floor (Channel A)	Noise Floor (Channel B)
2013-04-01 02:00:00	2013-04-09 12:54:49	DC Demo Reader	-115 dBm	-115 dBm
2013-04-01 02:00:00	2013-04-09 12:54:49	PDU Demo Reader	0 dBm	0 dBm
2013-04-01 02:00:00	2013-04-09 12:54:49	PDU Demo Reader2	0 dBm	0 dBm
2013-04-01 02:00:00	2013-04-09 12:54:49	PDU Demo Reader3	0 dBm	0 dBm
2013-04-01 02:00:00	2013-04-09 12:54:49	PDU Demo Reader4	0 dBm	0 dBm

The following System Reports are available in the Admin Console:

- Consolidated System Report
- Reader Custom Report
- Reader Noise Report
- Reader Offline Report
- Reader Online Report
- System Alert Report
- User Access Report
- Zone Manager Custom Report

- Zone Manager Offline Report
- Zone Manager Online Report

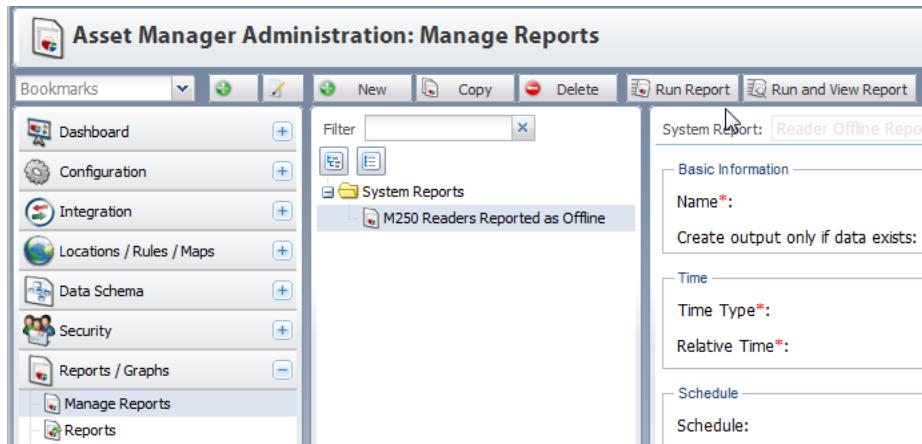
The following Reports are available in the User Console:

- Asset Alert Report
- Assets in Motion Report
- Assets With Low Battery Level Report
- Assets With Panic Report
- Assets With Tamper Report
- Consolidated Asset Report
- Custom Report
- Door Close Report
- Door Open Report
- Expected Location Report
- Humidity Report
- Location Change Report
- Offline Asset Report
- Online Asset Report
- Summary Report - Assets by Location
- Summary Report - Assets by Type
- Summary Report - Assets By Unexpected Location
- Temperature Report
- Unassigned Tag Report
- Unexpected Location Report

xxx-yyy	DRAFT 173	7/2/2015
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- Untagged Asset Report

Reports can be run at any time or they can be scheduled either to run once or according to a defined schedule at specific times in the future.



To Create a New Report

1. Navigate to **Reports/Graphs > Manage Reports** and click **New**.
2. Select the Report type from the drop-down.
3. Complete all required and any desired additional fields.

Basic Information

- **Name:** Assign a name to the Report.

- **BIRT Template:** Click the Ellipsis ... button to access a list of available templates.

BIRT Templates for SLA compliance are included in Asset Manager, and templates you create and upload appear here. Move items from Available to Selected as desired. Click **OK** when finished.

- **Create output only if data exists:** check this box to prevent the creation of empty reports. If unchecked, Asset Manager will create a report if a report is scheduled to be created, even if the report contains no data.

xxx-yyy	DRAFT 174	7/2/2015
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Security

- **Execution User Account:** On the User Console, this drop-down menu provides a list of users. The Execution User Account, when used in conjunction with Admin Security, can limit report execution to authorized users. The default value of Admin is appropriate for most situations.

Time

- **Lead In Timestamps:** Include attribute state changes if they occurred before the specified report time. For example, if you are generating a report to show offline assets during a specific week, and some of the assets went from online to offline before the report start time, then that information will be included in the report. If you leave this box unchecked, the report will only show the state of the attribute at the specified start time.
- **Time Type:** Select from Relative, Specific, Calendar, or Consolidated Time Range.
- **Consolidated Report Time:** If Consolidated Time Range is chosen, select from Beginning of consolidated report, End of consolidated report, or Same time range as consolidated report.
- **Time Range** Select the period.
- **Reports:** for Consolidated Reports. Click the Ellipsis ... button to access a list of available reports to include. Move items from Available to Selected as desired. Click **OK** when finished.

Schedule

- **Schedule:** Click the Ellipsis ... button to access the scheduler. Set frequency to daily, weekly, or monthly and select the start time.
- **Enable Schedule:** Check this box to enable the schedule. Temporarily disable an schedule without deleting it by unchecking this box.

Actions

- **Action Format:** Select output format for report or graph distributed via Action. Reports and Graphs can be sent in CSV, JSON, PDF, SQLITE, or XML formats.

xxx-yyy	DRAFT 175	7/2/2015
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- **Report/Graph Actions:** Click the Ellipsis ... button to access a list of available Email, FTP, or HTTP Post actions. Move actions from Available to Selected as desired. Click **OK** when finished.
 - **Filters:** Filters define the criteria that must be met in order for data to be included. Select Attributes, Value Operators, and Values to limit the amount of data included. Leave empty to include all data related to the type and time specified.
 - **Post-Conditions:** Set to include all status changes for items meeting criteria during any part of specified period.
 - **Exceptions:** Select to define data change handling. Every change to an Exception Attribute during the report period is included. If no exception attributes are specified, then all of the column attributes are used as exception attributes for the report.
 - **Columns:** Select Attributes to display. Click the Ellipsis ... button to access a list of available Attributes. Move actions from Available to Selected as desired. Click **OK** when finished.
4. **Save Changes.**

To Run a Report

1. Navigate to **Reports/Graphs > Manage Reports**.
2. Select the Report from the list in the middle pane.
3. Click **Run Report** or **Run and View Report**.
Run Report behaves as if scheduled to run immediately. Navigate to **Reports/Graphs > Reports** to view the report once completed.
Run and View Report displays results onscreen without requiring you to navigate away from the Manage Reports Task.
4. Enter a name for the report.
5. If Run and View Report selected, click **Run in Background** if desired.
6. When complete, the report opens in a pop-up.

xxx-yyy	DRAFT 176	7/2/2015
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To Export a Report

1. Navigate to **Reports/Graphs**.
2. To export a completed report, select the **Reports** sub-task, select the report, and click **View**.
To run and export a new report, **Run and View Report**.
3. From View Report Window, click desired **Export Format** button.

To Delete a Report Template

1. Navigate to **Reports/Graphs > Manage Reports**.
2. Select the report from the list in the middle pane.
3. Click **Delete**.

The template is deleted, but any reports that have been run remain.

To Delete a Report

1. Navigate to **Reports/Graphs > Reports**.
2. Select the report.
3. Click **Delete**.

The report is deleted, but the template remains.

Create Reports

To create a new report, perform the following steps:

1. Navigate to **Reports/Graphs > Manage Reports**.

The Manage Reports task pane will appear on the right and is divided into two sections: the list of defined reports on the left and the Editor on the right.

At the top of the task pane are several buttons: **New**, **Copy**, **Delete**, **Run Report**, **Run and View Report**, **New Folder**, **Edit Folder** and **Delete Folder**.



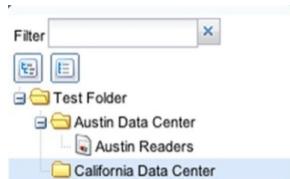
2. To create a folder or folders for the various report definitions you are creating, click the **New Folder** button.

A dialog box will appear.

3. Type in a name for the new folder and then click the **Create Folder** button.



The new folder will appear in the data tree on the left.



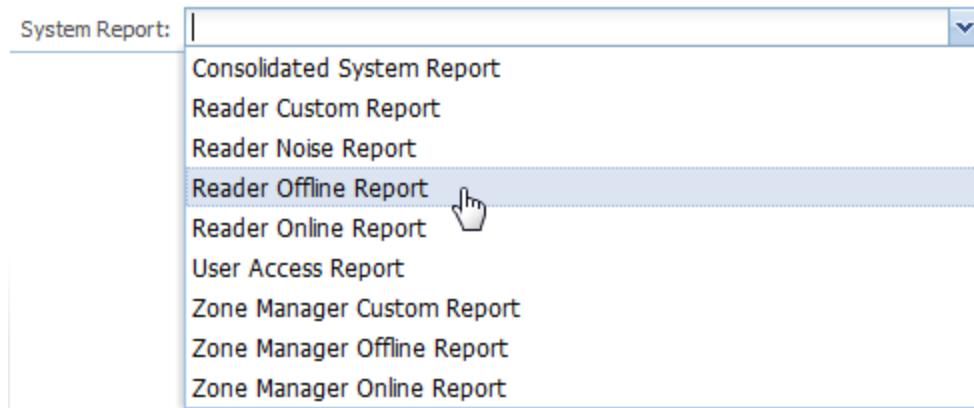
NOTE: To edit the folder, click the **Edit Folder** button.

NOTE: To delete a folder, click the **Delete Folder** button. The folder will be removed from the data tree.

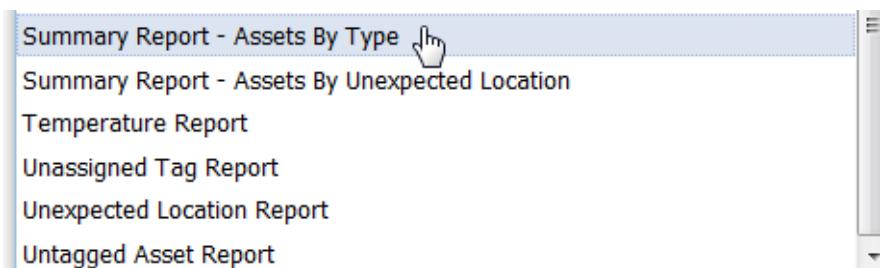
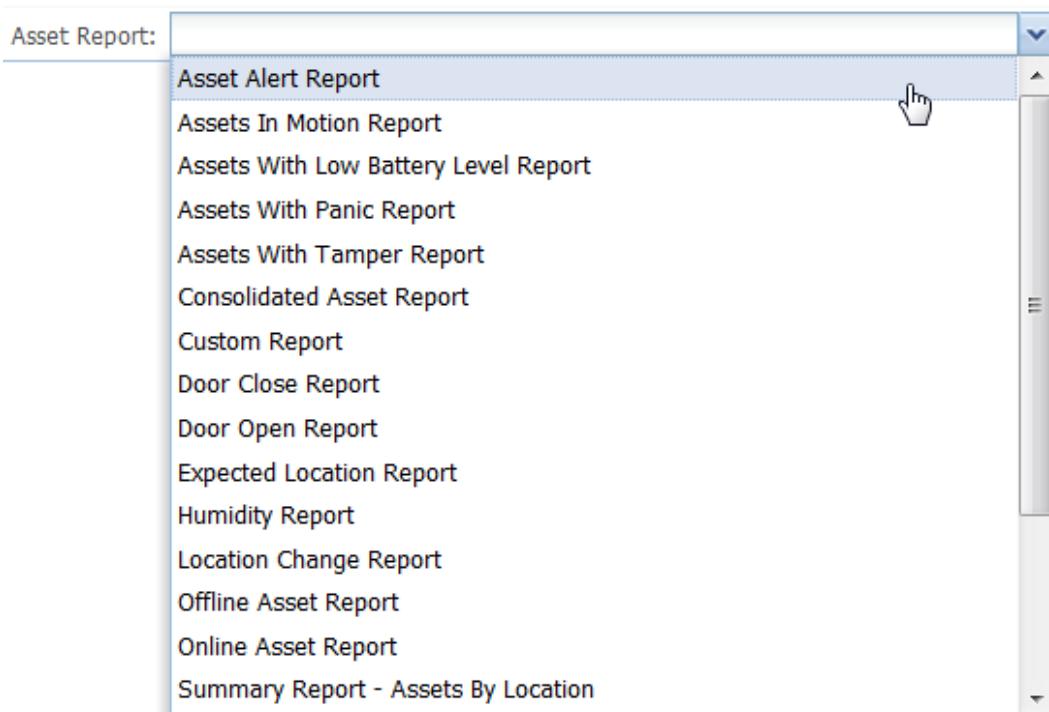
4. Click the **New** button to create a report.

xxx-yyy	DRAFT 178	7/2/2015
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5. Select a report template from the **System Report** drop-down menu (in the Admin Console).



Or select an Asset Report from the Asset Report menu (in the User Console).



After choosing a report template, the report editor screen will then appear to let you configure the new report definition.

Configuring Report Template Definitions

Configuring report definitions is essentially the same in both the Admin Console and in the User Console, with the exception that the User Console offers an additional Security configuration option that lets the Report creator define an Execution User Account. Otherwise, the configuration fields are the same for both, although the Attribute options for Filters, Conditions, and Columns differ depending upon what type of report is chosen, that is, you can display Temperature in a Temperature Report defined in the User Console but not in a Reader Noise Report defined in the Admin Console, for obvious reasons.

The report editor is divided into the following sections: Basic Information, Security, Time, Schedule, Actions, Filter, Post-Condition, Exception Condition, Columns

The first five sections available when configuring Report Definitions are shown:

xxx-yyy	DRAFT 180	7/2/2015
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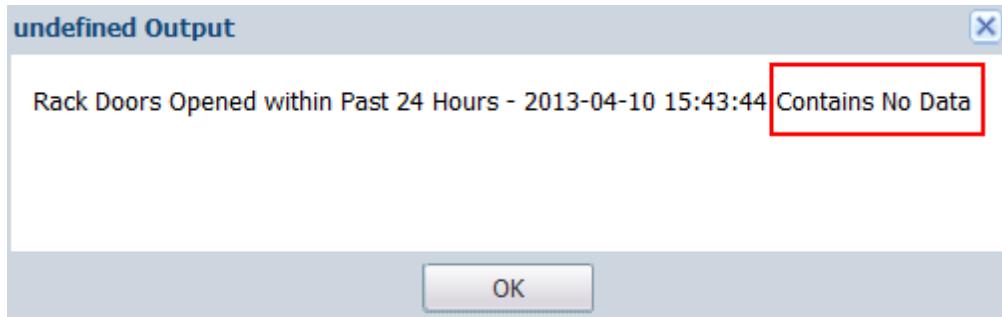
Basic Information	
Name*:	<input type="text"/>
BIRT Asset Template:	<input type="text"/> ...
Create output only if data exists: <input checked="" type="checkbox"/>	
Security	
Execution User Account:	admin <input type="button" value="X"/> <input type="button" value="▼"/>
Time	
Lead In Timestamps:	<input type="checkbox"/>
Time Type*:	<input type="text"/> <input type="button" value="▼"/>
Schedule	
Schedule:	<input type="text"/> ...
Enable Schedule:	<input type="checkbox"/>
Actions	
Action Format:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
Report/Graph Actions:	<input type="text"/> ...

Basic Information

The Basic Information section lets you name the report. Each report must have a unique name. The name can be long and have spaces. Long names are fine, especially since each Report name should give enough information to let you and others know exactly what kind of report it is.

NOTE: For more information about Advanced Reporting with BIRT, refer to the RF Code website: <http://www.rfcode.com/Software/advanced-reporting-module.html> The Basic Information section also has a checkbox "Create output only if data exists". When this is checked the Asset Manager system will only create report output if there is representative data in the database for the conditions that you have specified. This prevents the system from generating reports that have no data rows.

If the box is checked and you do try to run a report without data, an Undefined Output message appears:



Security

The Execution User Account, when used in conjunction with Admin Security, can limit report execution to authorized users. The default value of Admin is appropriate for most situations.

Time

The Time section for Reports lets you set specific (or relative) times or time ranges for reports.

NOTE: If you change the time zone on the Asset Manager server, some system features may behave unexpectedly (scheduled reports, alerts, etc.). After changing the time zone, you must reboot the Asset Manager server so that the time change is detected by Asset Manager.

The following Types of report time definitions (criteria) are available:

Relative Time

You can configure Time to show conditions for **Now, 6 Hours Ago, 12 Hours Ago, 1 day ago, 7 days ago, 30 days ago, 60 days ago, or 90 days ago**.

Specific Time

An example of a specific time for a report is:

1:00pm on 11/14/2008

Relative Time Range

An example of a relative time range is: *Last Hour, Last 6 Hours, Last 12 Hours, Last Day, Last 7 Days, Last 30 Days, Last 60 Days, or Last 90 Days.*

Specific Time Range

An example of a specific time range for a report is

1:00pm on 11/14/2008 to 8:00pm on 11/14/2008

Calendar Time Range

You can configure Time to show conditions for *This Day, This Week, or This Month.*

Lead In Timestamps:

Include attribute state changes if they occurred before the specified report time. For example, if you are generating a report to show offline assets during a specific week, and some of the assets went from online to offline before the report start time, then that information will be included in the report. If you leave this box unchecked, the report will only show the state of the attribute at the specified start time.

Report Schedule

The Report Schedule section allows the report to be configured to run on a scheduled basis. Scheduled reports can be run on a daily, weekly or monthly basis. When the Report schedule ellipsis [...] button is clicked, the scheduler window will appear allowing you to select the appropriate schedule for the report.



NOTE: The Enable Schedule option must be selected in order for the schedule to take effect. To temporarily disable the scheduled report while preserving the schedule settings, uncheck the box.

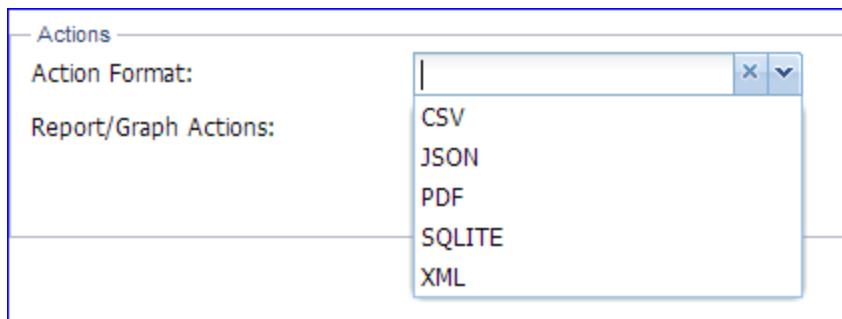
Report Actions

The Report Action section lets you choose an Action (if one has been configured using the Actions sub-task) and a format for the report.

NOTE: For more information on configuring Actions for Reports, refer to the [Using Actions with Reports and Graphs](#) section.

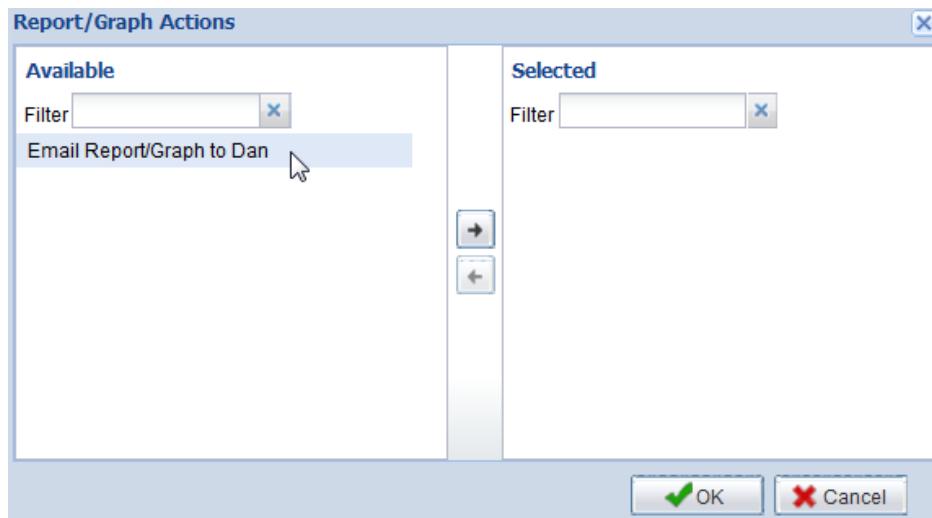
To use a configured report action, perform the following steps:

1. Choose an **Action Format** from the drop-down list (**CSV, JSON, PDF, SQLITE, or XML**).

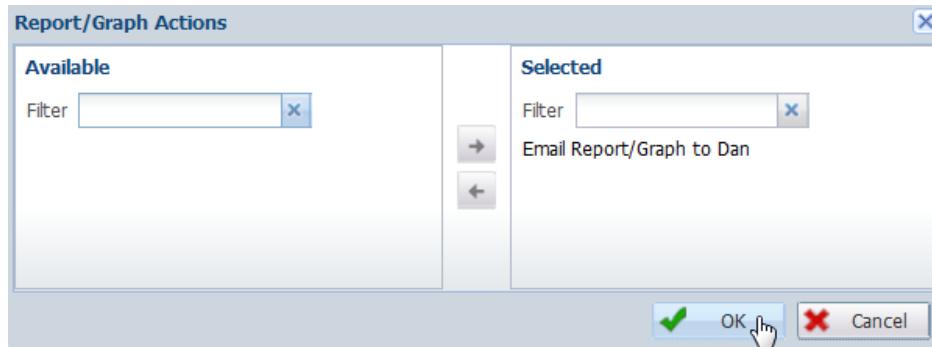


2. Click the ellipsis [...] button beneath the Action Format drop-down button.

The Report/Graph Actions window appears.



3. Choose one or more Report/Graph Actions and click the right-arrow (or double-click Report/Graph Actions) to move it from the Available to the Selected window pane.



4. Click the **OK** button.

The Actions section is now configured.

Actions	
Action Format:	PDF
Report/Graph Actions:	<input style="width: 150px; height: 30px;" type="button" value="Email Report/Graph to Dan"/>

Report Filters, Post-Conditions, Exception Conditions, and Columns Settings

The last four sections available when configuring Report Definitions are shown below.

Filter

Filter Type:	Reader
First Attribute:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
First Attribute Value Operator:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
First Attribute Value:	<input type="text"/>
Second Attribute:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
Second Attribute Value Operator:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
Second Attribute Value:	<input type="text"/>

Post-Condition

Attribute:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
Attribute Value Operator:	<input type="text"/> <input type="button" value="X"/> <input type="button" value="▼"/>
Attribute Value:	<input type="text"/>

Exception Condition

Exception Attributes:	<input type="text"/> <input type="button" value="▲"/> <input type="button" value="▼"/> <input type="button" value="..."/>
-----------------------	---

Columns

Attributes*:	<table border="0"> <tr> <td>Name</td> <td><input type="text"/></td> </tr> <tr> <td>Noise Floor (Channel A)</td> <td><input type="text"/></td> </tr> <tr> <td>Noise Floor (Channel B)</td> <td><input type="text"/></td> </tr> </table>	Name	<input type="text"/>	Noise Floor (Channel A)	<input type="text"/>	Noise Floor (Channel B)	<input type="text"/>
Name	<input type="text"/>						
Noise Floor (Channel A)	<input type="text"/>						
Noise Floor (Channel B)	<input type="text"/>						

Report Filter and Post Conditions

The Filter and Post-Condition sections define the criteria that must be met in order for a row of data to be included in a report.

xxx-yyy	DRAFT 186	7/2/2015
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NOTE: If you leave the Filter and Post-Condition sections empty, all rows related to the type and time specified in the report configuration will be included.

Both the filter and the post-condition are configured by selecting at least one Attribute, a Value Operator, and a Value. For example, you could choose to filter values in a report for those readers that are offline for any or all of a report time range with the following configuration:

- Attribute = Reader State
- Operator = Equals (=)
- Value = ACTIVE

This same Filter configuration example could be used for Zone Manager, such that report rows would only be produced for Zone Manager attribute changes that happen while the device is Active, that is, to create a report showing only the status of a reader or Zone Manager when that reader or Zone Manager is online.

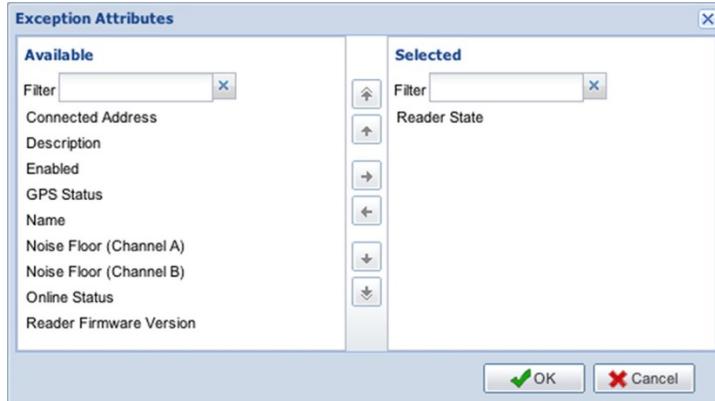
Report Post-Conditions

If the example above (Online Status, Has Value) was used in the post-condition section of the report, then report rows would be produced for all attribute value changes for any Zone Manager that had a value for online status at least once during the reporting period. In other words, the report may produce rows for attribute changes that happen when the online status did not have a value, but ONLY if at least one row of data in the report for that Zone Manager had an online status value.

Report Exception Conditions (Exception Attributes)

Exception Attributes are a list of attributes that are evaluated for report data changes. For instance, if a reader went through several state changes during the configured report period then each of those changes will become a row in the report only if "Reader State" is selected as an exception condition (or if no exception conditions are specified AND "Reader State" is included in the column attributes). If that same reader only has "Noise Floor (Channel A)" as an exception attribute, then even if "Reader State" is a column attribute the reader state changes will not be reported as column rows;

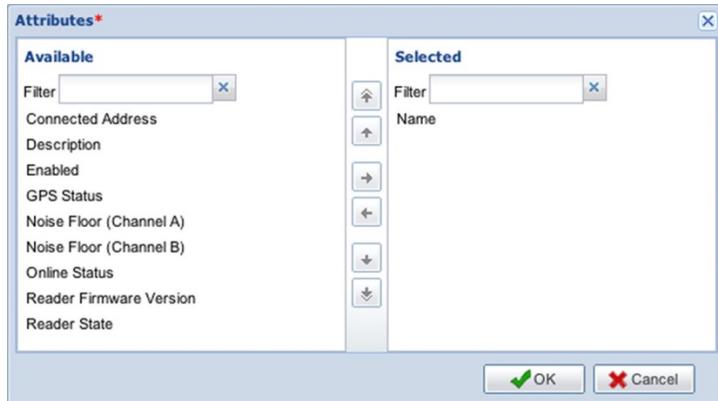
instead, the reader state column will report whatever the reader state was when "Noise Floor (Channel A)" changed value.



If no exception attributes are specified, then all of the column attributes are used as exception attributes for the report.

Report Columns (Attributes)

The final section of the report editor is the Report Columns section. This section lets you choose what information will appear in the report columns. By default the "Name" attribute is always in the list. By clicking the Ellipsis [...] button, the following window will appear to allow more columns to be selected.



Use the left and right arrows to move attributes between the available and selected list boxes. Use the up and down arrows to order the attributes in the selected list box (and consequently in the Report itself).

Once the correct information is completed in the report editor, click the **Save Changes** button at the bottom of the editor screen to save the report. At this point the report is defined, created and ready to run.

NOTE: A copy of a report can be made so that a user can quickly build a new report based on an existing report. To do this, click the **Copy** button.

Running and Viewing Reports

To run a report from the Manage Reports configuration task, perform the following steps:

1. Select the appropriate report from the list of reports and then click on the **Run Report** or the **Run and View Report** button.

A window appears, prompting you to name the report.



By default a name is provided which is the name of the report in addition to the day, date and time of the run.

2. Use the generated name or edit the name and then click **OK** to run the report. All outputs of reports that are run are available on the Reports sub-task.

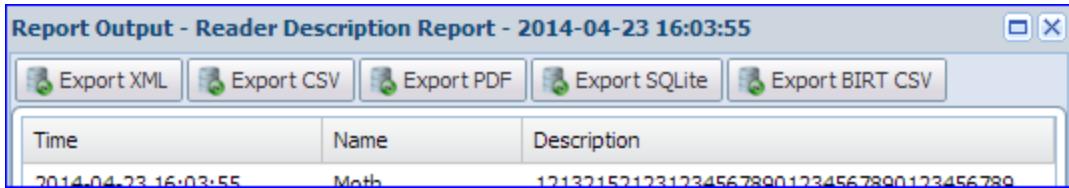
NOTE: If the **Run and View Report** button is selected, then you will be prompted for the report name just as before, but after the report finishes running the report output will be shown without the need to go to the Reports sub-task to view it.

NOTE: You can also view reports from the Reports configuration task, either by clicking the View button or by double-clicking the name of any listed report.

A Report Output pop-up window opens.

3. To export the Report, highlight it and then click the **Export XML**, **Export CSV**, **Export PDF**, **Export SQLite**, or **Export BIRT CSV** button.

xxx-yyy	DRAFT 189	7/2/2015
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Exporting Reports

In addition to viewing report results inside Asset Manager, report results can be exported to PDF, XML, CSV, BIRT CSV, or SQLite formats.

There are two places from which you can export reports:

- In the Reports sub-task there is an Export button with a combo field to the right of it. Choose the format in the combo field and then click the Export button to export the report.
- When viewing the results of a report in Asset Manager the View Report window has three buttons corresponding to the three format types that are available for export. Simply click the button corresponding to your desired format and the report will be exported.

When you choose to export a report, you will either be prompted to save the report or your browser will open it in a new window/tab, depending on how your browser is configured.

Deleting Reports

To delete a report, select a report from the list and then click the **Delete** button.

NOTE: Deleting a report does not delete the output of other reports that have already been run, nor does deleting a report definition template, which only deletes the template definition.

Graphs

Graphs and Reports are very similar. As with Reports, Graphs are first defined and then run, either manually from the Graphs task area or programmatically through scheduling and other functions.

The major difference between Reports and Graphs is that Graphs allow you to create visual representations of the same information that you can create with Reports, although there is a balance between how much information you include in your Graphs and how useful or discernible the information is to you, that is, if you include too many parameters, your Graph will at best not be visually appealing and at worst not informative or useful at all.

RF Code provides a number of Graph Templates with Asset Manager that you can use to create Graphs about the data being collected by your readers and Zone Manager(s). These Graph Templates can be customized in order to suit your needs to view specific information. There is also a Custom Graph Template for readers and Zone Managers that allow for complete customization of the contents of the Graph within the bounds of the Asset Manager graphing capabilities.

Manage Graphs

The Manage Graphs task lets you specify what will be graphed and how. Asset Manager provides some standard graph templates to help you create graphs, but you can also create completely customized Graphs.

Graphs can be created on both the Admin Console and the User Console. Configuration fields differ depending upon the type of Graph. Graphs are produced in a linear style with the axis determined by the criteria you specify.

To Create a New Graph

1. Navigate to **Reports/Graphs > Manage Graphs** and click **New**.
2. Select the Graph Template from the drop-down.

xxx-yyy	DRAFT 191	7/2/2015
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3. Complete all required and any desired additional fields.

Basic Information

- **Name:** Assign a name to the Graph.
- **Create output only if data exists:** check this box to prevent the creation of empty reports. If unchecked, Asset Manager will create a report if a report is scheduled to be created, even if the report contains no data.

Security

- **Execution User Account:** On the User Console, this drop-down menu provides a list of users. The Execution User Account, when used in conjunction with Admin Security, can limit report execution to authorized users. The default value of Admin is appropriate for most situations.

Time

- **Lead In Timestamps:** Include attribute state changes if they occurred before the specified report time. For example, if you are generating a report to show offline assets during a specific week, and some of the assets went from online to offline before the report start time, then that information will be included in the report. If you leave this box unchecked, the report will only show the state of the attribute at the specified start time.
- **Time Type:** Select from Relative, Specific, Calendar, or Consolidated Time Range.
- **Consolidated Report Time:** If Consolidated Time Range is chosen, select from Beginning of consolidated report, End of consolidated report, or Same time range as consolidated report.
- **Time Range** Select the period.

Schedule

- **Schedule:** Click the Ellipsis ... button to access the scheduler. Set frequency to daily, weekly, or monthly and select the start time.

xxx-yyy	DRAFT 192	7/2/2015
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- **Enable Schedule:** Check this box to enable the schedule. Temporarily disable an schedule without deleting it by unchecking this box.

Actions

- **Action Format:** Select output format for report or graph distributed via Action. Reports and Graphs can be sent in CSV, JSON, PDF, SQLITE, or XML formats.
- **Report/Graph Actions:** Click the Ellipsis ... button to access a list of available Email, FTP, or HTTP Post actions. Move actions from Available to Selected as desired. Click **OK** when finished.
- **Filters:** Filters define the criteria that must be met in order for data to be included. Select Attributes, Value Operators, and Values to limit the amount of data included. Leave empty to include all data related to the type and time specified.
- **Post-Conditions:** Set to include all status changes for items meeting criteria during any part of specified period.
- **Exceptions:** Select to define data change handling. Every change to an Exception Attribute during the report period is included. If no exception attributes are specified, then all of the column attributes are used as exception attributes for the report.
- **Columns:** Select Attributes to display. Click the Ellipsis ... button to access a list of available Attributes. Move actions from Available to Selected as desired. Click **OK** when finished.

Appearance

- **Graph Size:** Choose the size of the graph.
- **Background Color:** Leave as default for white or select desired color.
- **Line Thickness:** Set border around graph.
- **Group Axis by Unit:** Select to group axis values by unit where attributes share a common attribute unit type. If this box is not checked and two or more attributes are chosen, then each of the attributes will be given its own Y-axis.

xxx-yyy	DRAFT 193	7/2/2015
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- **Show graph grid:** Select to display a grid on the graph.
 - **Graph legend location:** Specify location of legend.
4. **Save Changes.**

To Run a Graph

1. Navigate to **Reports/Graphs > Manage Graphs**.
2. Select the Graph from the list in the middle pane.
3. Click **Run Graph** or **Run and View Graph**.

Run Graph behaves as if scheduled to run immediately. Navigate to **Reports/Graphs > Graphs** to view the graph once completed.

Run and View Graph displays results onscreen without requiring you to navigate away from the Manage Graphs task.

4. Enter a name for the graph.
5. If Run and View Graph selected, click **Run in Background** if desired.
6. When complete, the graph opens in a pop-up.

To Export a Graph

1. Navigate to **Reports/Graphs**.
2. To export a completed graph, select the **Graphs** sub-task, select the report, and click **View**. To run and export a new graph, **Run and View Graph**.
3. From View Graph Window, click **Export**.

To Delete a Graph Template

1. Navigate to **Reports/Graphs > Manage Graphs**.
2. Select the report from the list in the middle pane.
3. Click **Delete**.

xxx-yyy	DRAFT 194	7/2/2015
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The template is deleted, but any reports that have been run remain.

To Delete a Graph

1. Navigate to **Reports/Graphs > Graphs**.
2. Select the graph.
3. Click **Delete**.

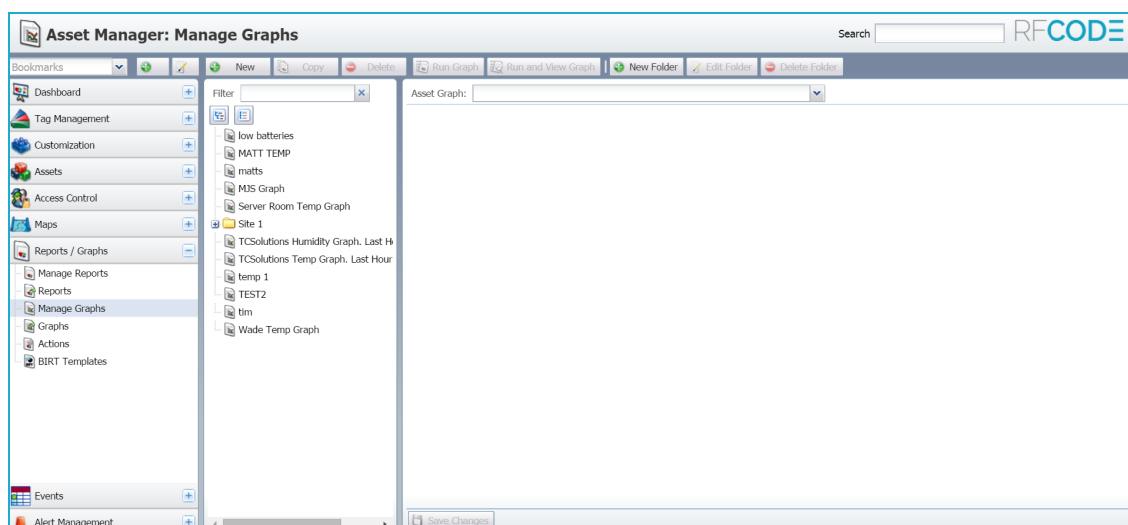
The report is deleted, but the template remains.

Creating Graph Template Definitions

To create a new graph definition, perform the following steps:

1. Navigate to **Reports/Graphs > Manage Graphs**.

The Manage Graphs task pane will appear on the right.



The Manage Graphs task pane is divided into two sections: the list of defined graphs (and Folders, if they have been created) on the left and the Graphs Editor on the right.

At the top of the task pane are several buttons: **New**, **Copy**, **Delete**, **Run Graph**, and **Run and View Graph**.

2. To create a folder, click the **New Folder** button.

The New Folder dialog box will appear.



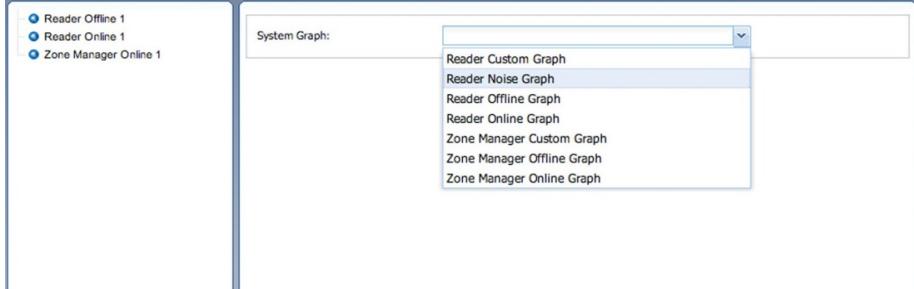
3. Type in a name for the folder and then click the **Create Folder** button.

The folder will now appear in the Data tree on the left.

NOTE: To edit the folder click the **Edit Folder** button. The Edit Folder Box will appear; here you can edit the name of the folder and then click the **Save Folder** button to save the changes.

NOTE: To delete a folder click the **Delete Folder** button and the folder will disappear from the data tree.

4. Click the **New** button to create a graph.
5. In the Graph Editor area, select a graph template from the list of available templates.



The Graph editor screen appears.

Configuring Graph Template Definitions

The Graphs editor is divided into the follow sections: Basic Information, Time, Schedule, Actions, Filter, Post-Condition, Columns, and Appearance.

xxx-yyy	DRAFT 196	7/2/2015
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System Graph: Reader Noise Graph ▼

Basic Information

Name*:

Create output only if data exists:

Time

Time Type*: ▼

Schedule

Schedule: ...

Enable Schedule:

Actions

Email Attachment: PNG X ▼

Report/Graph Actions: ...

Basic Information

Name: This section lets you name the graph. Each graph must have a unique name, but the name can be as long as necessary so that you can identify it precisely.

Time

The Time section lets you choose the time parameters for running the Graph. You can set specific (or relative) times or time ranges for Graphs, just the same as you can for Reports. The following Types of Graph time definitions (criteria) are available:

Relative Time

You can configure Time to show conditions for **Now, 6 Hours Ago, 12 Hours Ago, 1 day ago, 7 days ago, 30 days ago, 60 days ago, or 90 days ago.**

Specific Time

An example of a specific time for a report is:

1:00pm on 11/14/2008

Relative Time Range

An example of a relative time range is: *Last Hour, Last 6 Hours, Last 12 Hours, Last Day, Last 7 Days, Last 30 Days, Last 60 Days, or Last 90 Days.*

Specific Time Range

An example of a specific time range for a report is
1:00pm on 11/14/2008 to 8:00pm on 11/14/2008

Calendar Time Range

You can configure Time to show conditions for *This Day, This Week, or This Month.*

Graph Schedule

The Graph Schedule section allows the graph to be configured to run on a scheduled basis. Scheduled graphs can be run on a daily, weekly or monthly basis. When the Schedule button is clicked, the scheduler window will appear allowing you to select the appropriate schedule for the graph.

NOTE: You can only run five graph jobs simultaneously. If you choose more than five Graphs to run at once, the first five will be processed and any remaining graphs will be queued until one of the currently running graphs is complete; this prevents long running or complex graphs from consuming all available system and database resources.

NOTE: When the time zone is altered on the Asset Manager server, some system features may behave unexpectedly (scheduled reports, alerts, etc.). After changing the time zone, reboot Asset Manager to apply the new time zone.



NOTE: The Enable Schedule option must be selected in order for the schedule to take effect. To temporarily disable the scheduled report while preserving the schedule settings, uncheck the box.

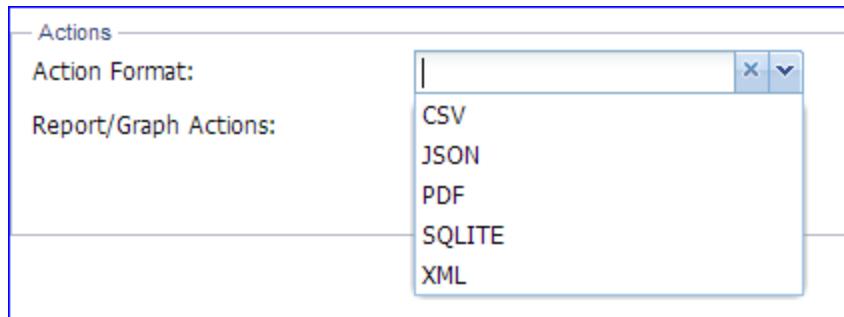
Graph Actions

The Graph Action section lets you choose an Action (if one has been configured using the Actions sub-task) and a format for the Graph.

NOTE: For more information on configuring Actions for Graphs, refer to the [Using Actions with Reports and Graphs](#) section.

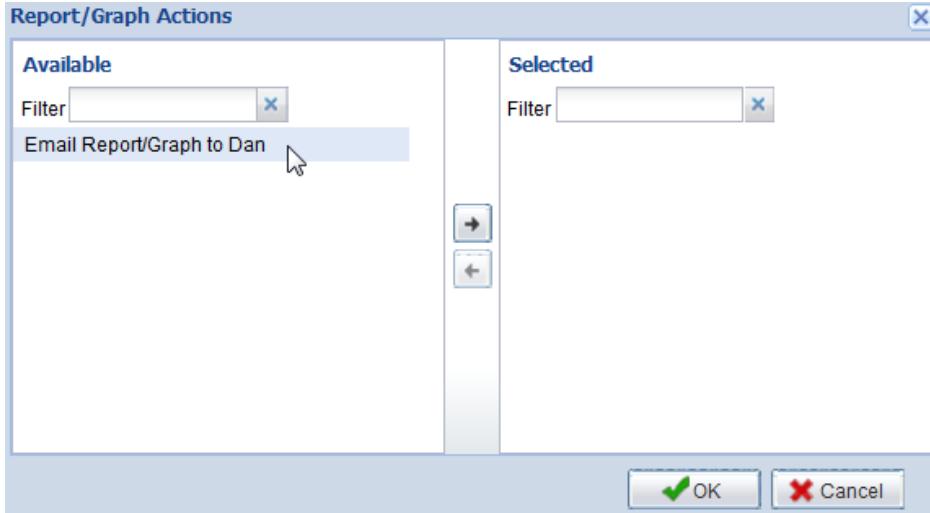
To use a configured Graph action, perform the following steps:

1. Choose an **Action Format** from the drop-down list (**CSV, JSON, PDF, SQLITE, or XML**).

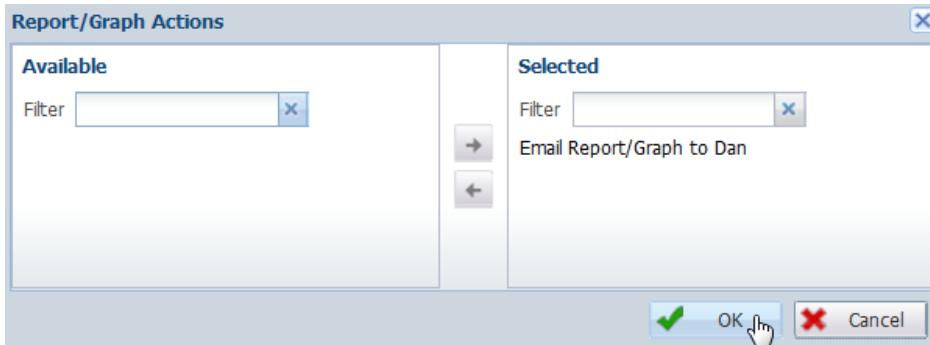


2. Click the Ellipsis [...] button beneath the Format drop-down button.

The Report/Graph Actions window will appear.



3. Choose one or more Report/Graph Actions and click the right-arrow (or double-click it) to move it from the *Available* to the *Selected* window.



4. Click the **OK** button.

The Actions section is now configured and will appear in the Report/Graph Actions area.

Graph Filters, Post-Conditions, Columns, and Appearance

The last four configuration areas for Graphs are Filter, Post-Condition, Columns, and Appearance.

xxx-yyy	DRAFT 200	7/2/2015
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Filter

Filter Type: First Attribute: First Attribute Value Operator: First Attribute Value: Second Attribute: Second Attribute Value Operator: Second Attribute Value:	Reader <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
--	---

Post-Condition

Attribute: Attribute Value Operator: Attribute Value:	<input type="text"/> <input type="text"/> <input type="text"/>
--	--

Graph Filter and Post-Condition

Filter and Post-Condition sections define the criteria that must be met in order for a data point to be included in a graph. If left blank, all data points related to the type and time specified in the graph configuration will be included.

Both the filter and the post-condition are configured by selecting an attribute, an operator, and a value as follows:

Attribute = *Reader State*

Value Operator = ==

Value = *Active*

If this example is used in the filter section of the graph definition then points on the graph will only be produced for Zone Manager attribute changes that happen while the reader is active (online).

If this example was used in the post-condition section of the graph definition then report rows will be produced for all attribute value changes for any reader that had a value for active status at least once during the graph's time period. In other words, the graph may produce data points for attribute

changes that happen when the online status did not have a value, but only if at least one point of data in the graph for that reader has an active value.

Graph Columns (Attributes)

The Graph Columns section allows for the selection of which information will appear in the graph.

Columns

Attributes*:

- Noise Floor (Channel A)
- Noise Floor (Channel B)

Appearance

Graph Size: 1024 x 768

Background Color: FFFFFF

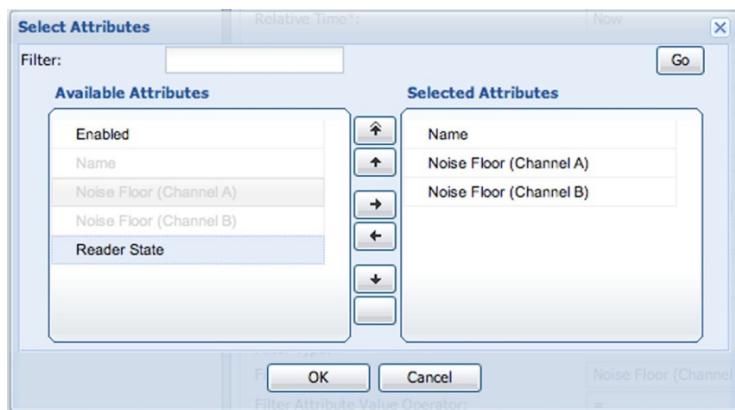
Line Thickness: 2

Group Axis by Unit:

Show graph grid:

Graph legend location: BOTTOM

By clicking the Ellipsis button [...] button, the following window will appear to allow columns to be selected.



Graph Appearance

The final section of the graph editor is the Appearance section.

xxx-yyy	DRAFT 202	7/2/2015
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Appearance

Graph Size:	1024 x 768	<input type="button" value="X"/> <input type="button" value="▼"/>
Background Color:	FFFFFF	<input type="color"/>
Line Thickness:	2	
Group Axis by Unit:	<input type="checkbox"/>	
Show graph grid:	<input type="checkbox"/>	
Graph legend location:	BOTTOM	<input type="button" value="X"/> <input type="button" value="▼"/>

This section allows you to:

- Choose the size of the Graph
- Choose a background color for the Graph (defaults to white)
- Choose the line thickness of the Graph
- Group axis values by unit
- Display a grid on the Graph
- Specify the location of the Graph legend

To configure the appearance of a graph, perform the following steps:

1. Choose whether or not to group the Y-axis of the graph by the unit type of the displayed attributes.

NOTE: If this box is not checked and two or more attributes are chosen, then each of the attributes will be given its own Y-axis. For example, since the reader noise attribute for channel A on a reader is a different attribute than for channel B, then two Y-axis will be produced, each with its own minimum and maximum values and the result may be that the point produced for the value of "-80" for Channel A might be at a different place than the point produced for the same value for Channel B. Since both of these attributes share the same attribute unit type, you can correct this problem by choosing to "Group Axis by Unit". By doing this, only one Y-axis will be produced that will represent both of the reader channels and all the points will line up correctly when compared to each other.

2. After you choose the graph configuration settings, click the **Save Changes** button at the bottom of the editor screen to save the graph.

At this point the graph is defined, created and ready to run.

NOTE: You can make a copy of a graph so that other users can quickly build a new graph based on an existing graph. To do this, click the **Copy** button.

Running Graphs

Graphs are shown in a table of available graph outputs. Graphs are categorized in the graph table by **Name**, **Job Start Time**, **Job Stop Time**, and **Graph Status**.

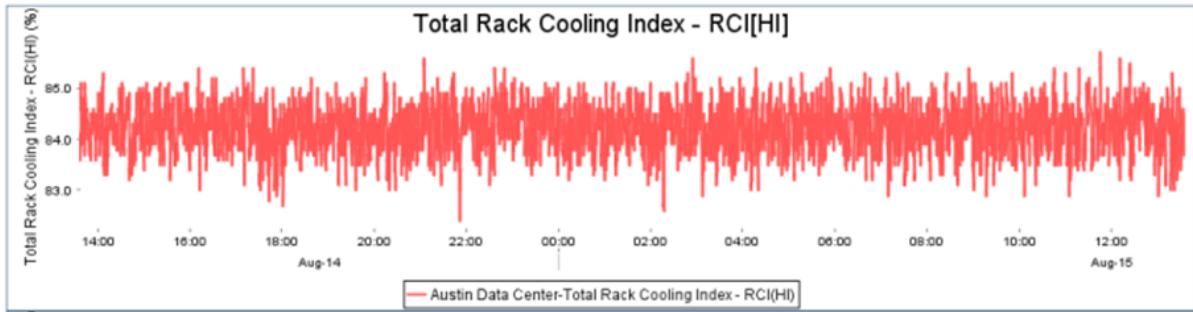
The Name column is self-explanatory. The Start Time and Stop Time values for a Graph define the temporal boundaries for the data displayed in the Graph, for example, reader noise readings for a time range of a week starting at midnight (12:00 AM) on a Monday morning and ending at 11:59PM on the following Sunday.

The Graph Status column lets you know if the Graph job has finished and if not, why not. Graph Status values are:

- **Complete:** This indicates that the Graph job is complete and ready to be viewed or exported.
- **Queued:** This indicates that the Graph job is in the queue waiting to be run.
- **Running:** This indicates that the Graph job is currently running.
- **Failure:** This indicates that the Graph job failed due to an internal error.

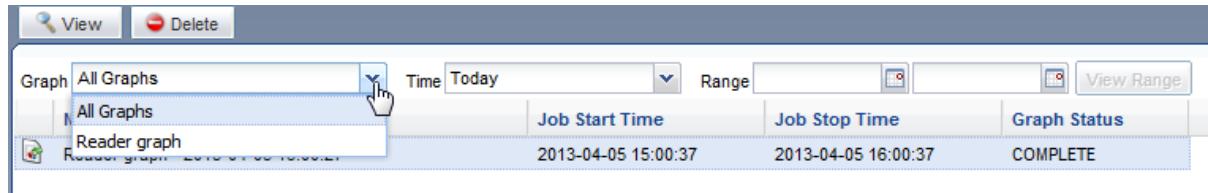
To view a graph, select the appropriate graph from the list and then click the **View** button.

A window will appear displaying the graph in PNG format, such as the one below.



Filtering Graphs

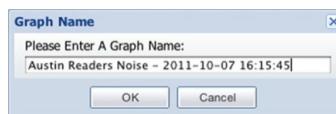
Above the list of Graphs available in the Graphs task (just beneath the View and Delete buttons), there are filters you can use to search for graphs.



The Graph Search Filters let you search by Type (as defined and named in Manage Graphs), by the Time the Graph was created, and by the Date or Date Range of the information presented in the Graph.

To run a graph, perform the following steps:

1. Select the appropriate graph from the list of graphs and then click on the **Run Graph** or the **Run and View Graph** button.
A window will appear prompting you to name the output of the graph.



2. By default a name is provided which is the name of the graph in addition to the day, date and time of the run. Use the supplied name or edit the name and then click **OK** to run the graph.
All outputs of graphs that are run are available on the Graphs sub-task.

3. If the **Run and View Graph** button is selected, the Graph for the report selected will be displayed in **PNG** format.

Viewing Graphs

After a graph is run, you can view the output in the **User Console** under **Graphs > Reports/Graphs**.

Deleting Graphs

Deleting a graph only deletes the graph definition. It does not delete the output of graphs that have already been run. To delete a graph definition, select the appropriate graph from the list and then click the **Delete** button.

Actions for Use with Reports and Graphs

Actions let you deliver a Report or Graph to one or more recipients using a specified protocol. With Actions, you can spawn an email, an HTTP post, or and FTP transfer when the Report or Graph is run, either on a schedule or interactively from the user interface.

To configure an Action:

1. Navigate to **Reports/Graphs > Actions**.
2. Click **New** and then select an action from the drop-down list (Email, FTP, or HTTP), or select a pre-existing action to edit.
3. The settings available in the actions pane enable you to configure the action and vary depending on the Type of Action.

xxx-yyy	DRAFT 206	7/2/2015
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Configure Email Actions for Reports and Graphs

Asset Manager can be set up to email Reports and Graphs automatically through an Action.

Create a New Email Action

1. Navigate to **Reports/Graphs > Actions**.
2. From the System Report/Graph Action drop-down, select **Email Report/Graph Action**.
3. Complete all required and any desired additional fields.

The screenshot shows a configuration form for an 'Email Report/Graph Action'. At the top, a dropdown menu is set to 'Email Report/Graph Action'. The form is divided into sections: 'Basic Information', 'Report Action Configuration', and 'Email Content'. In 'Basic Information', there are fields for 'Name*' (empty) and 'Enabled' (checked). In 'Report Action Configuration', there is a field for 'Email Address(es)*' (empty). In 'Email Content', there is a field for 'Email Subject Line' containing the macro '\${JOB_NAME}' and a '...' button.

NOTE: Those fields with asterisks (*) are required fields.

- **Name:** The name of the email action.
- **Enabled:** Check this box to enable the Email Action. Temporarily disable an action without deleting it by unchecking this box.
- **Email Address(es):** Specify one or more valid email addresses.
- **Email Subject Line:** Specify or generate programmatically with macros.

xxx-yyy	DRAFT 207	7/2/2015
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NOTE: The Macro function can be used to populate the Subject line of your email alerts. For more information, refer to the [Macros](#) section in the Appendix.

4. Save Changes.

All Actions created in the system are available in the Report/Graph Actions dialog, and can be assigned to new or existing reports.

Configure FTP Actions for Reports and Graphs

Asset Manager can be set up to send Reports and Graphs automatically by FTP through an Action.

Create a New FTP Action

1. Navigate to **Reports/Graphs > Actions**.
2. From the System Report/Graph Action drop-down, select **FTP Report/Graph Action**.
3. Complete all required and any desired additional fields.

The screenshot shows a configuration dialog for an 'FTP Report/Graph Action'. At the top, a dropdown menu is set to 'FTP Report/Graph Action'. Below it, the 'Basic Information' section contains fields for 'Name*' (a text input field) and 'Enabled' (a checked checkbox). In the 'File Transfer Information' section, there are three fields: 'Transfer Protocol*' (a dropdown menu), 'Remote Directory*' (containing the macro \${TYPE}/\${DATE} with a browse button ...), and 'File Name*' (containing the macro \${NAME}_\${TIME} with a browse button ...).

NOTE: Those fields with asterisks (*) are required fields.

xxx-yyy	DRAFT 208	7/2/2015
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- **Name:** The name of the FTP action
- **Enabled:** Check this box to enable the FTP Action. Temporarily disable an action without deleting it by unchecking this box.
- **Transfer Protocol:** Either FTP or SFTP (SSH File Transfer)
- **Remote Directory:** Specify or generate programmatically with macros
- **File Name:** Specify or generate programmatically with macros

NOTE: The Macro function can be used to populate the Subject line of your email alerts. For more information, refer to the [Macros](#) section in the Appendix.

4. Save Changes.

All Actions created in the system are available in the Report/Graph Actions dialog, and can be assigned to new or existing reports.

Configure HTTP Post Actions for Reports and Graphs

Asset Manager can be set up to post Reports and Graphs automatically to a website through an Action.

Create a New HTTP Post Action

1. Navigate to **Reports/Graphs > Actions**.
2. From the System Report/Graph Action drop-down, select **HTTP Post Report/Graph Action**.
3. Complete all required and any desired additional fields.

xxx-yyy	DRAFT 209	7/2/2015
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System Report/Graph Action: <input type="text" value="HTTP Post Report/Graph Action"/> <input type="button" value="▼"/>	
Basic Information	
Name*:	<input type="text"/>
Enabled:	<input checked="" type="checkbox"/>
Report Action Configuration	
Primary HTTP URL*:	<input type="text"/>
Secondary HTTP URL:	<input type="text"/>
SSL*:	<input type="text" value="Do not use SSL"/> <input type="button" value="▼"/>
HTTP Username:	<input type="text"/>
HTTP Password:	<input type="password" value="*****"/>
Confirm Password:	<input type="password" value="*****"/>

NOTE: Those fields with asterisks (*) are required fields.

- **Name:** The name of the FTP action
- **Enabled:** Check this box to enable the FTP Action. Temporarily disable an action without deleting it by unchecking this box.
- **Primary HTTP URL:** The primary URL of the HTTP server
- **Secondary HTTP URL:** A URL to use if Asset Manager fails to connect to the Primary HTTP URL
- **SSL:** There are three SSL modes you can select from:
 - **Do not use SSL:** No encryption or verification.
 - **SSL – No Verification:** Selecting this option indicates that the HTTPS protocol should be used but errors in the destination host's digital certificate, such as expiration, untrusted signing authority, and host verification should be ignored.

xxx-yyy	DRAFT 210	7/2/2015
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- **SSL – Verify Certificate and Hostname:** Selecting this option requires that the HTTPS protocol be used, the communication to and from the host will be encrypted, and will require that the digital certificate of the destination host be valid.
 - **HTTP Username:** The user name you need to access the HTTP URL (For HTTP Basic Authentication)
 - **HTTP Password:** The password your user needs to access the HTTP URL(For HTTP Basic Authentication)
 - **Confirm Password:** The same password as above
4. **Save Changes.**

All Actions created in the system are available in the Report/Graph Actions dialog, and can be assigned to new or existing reports.

Maps

In Asset Manager, a map is built upon an imported image and customized to provide information about assets and environmental conditions in that location.

A map is a visual representation of a geographical area. Maps can be created for any location defined in your location hierarchy, and multiple maps can be associated with the same location. Maps are categorized into Map Families, and can be nested so that clicking on one map opens a more detailed map of a smaller area.

Map images can be bitmaps of any size (PNG, JPG, BMP, GIF, SVG, etc.). Hot Spots specify locations on a map and have hover attributes that can be configured to display desired details. Hot Spot Links can be assigned to link maps to other maps, asset placement, or URLs. Map Attributes, available in the Map Attributes Box you can place on a map, let you display additional information about the map or a part of the map.

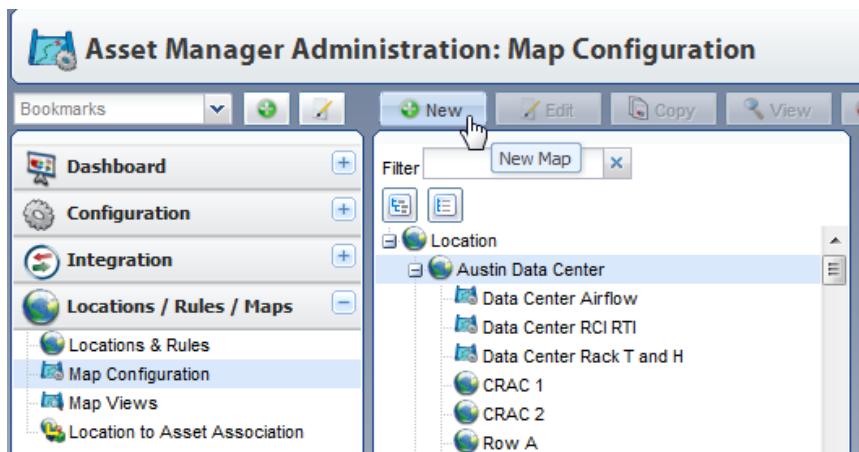
xxx-yyy	DRAFT 211	7/2/2015
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To create or edit a map, navigate to **Admin Console > Locations/Rules/Maps > Map Configuration.**

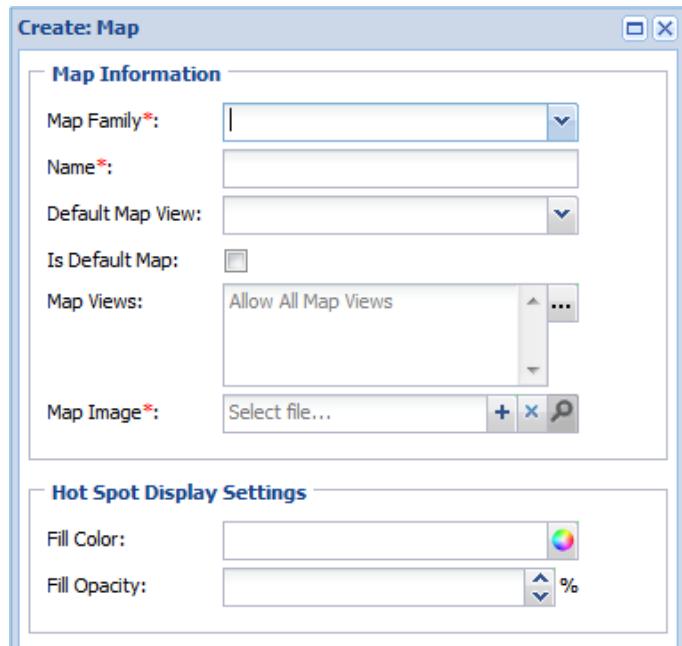
Creating Maps

To create a map in Asset Manager, perform the following steps:

1. In the **Admin Console**, navigate to **Locations/Rules/Maps > Map Configuration**.
2. From the **Location hierarchy** in the middle pane, select the level on which you want the map to be displayed, for example, Austin Data Center.
3. Click **New** to create a new map.

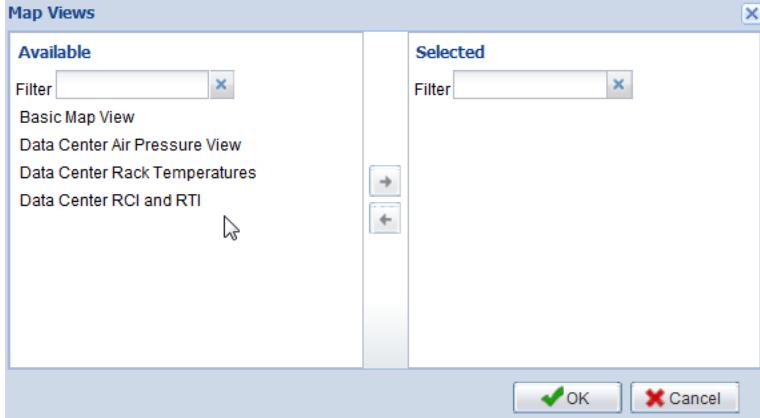


4. Complete all required and any desired additional fields.



- **Map Family:** Create categories for your maps. Initially, there are no Map Families in the system; therefore, whatever you type in the field will be saved as a Map Family and available for future use. Subsequent uses of this field will give you a list of all of the Map Families that you have previously created and which have been added to the drop-down selection menu.
- **Name:** This field is an arbitrary designation, but when someone sees the name of the map in the Location Hierarchy it should be obvious what the Map represents.
- **Default Map View:** This option lets you define which view will be defaulted to when this map is browsed to.
- **Is Default Map:** Check this box to default to this particular map if the location is clicked on in the Map View.
- **Map Views:** This option can restrict specific views of the map to certain users. Map Views simply define which sensor/attribute(s) and/or data can be displayed for the respective hot spot in the map view.

xxx-yyy	DRAFT 213	7/2/2015
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NOTE: To add or edit a Map View, click **Map Views** in the **Locations/Rules/Maps** task list.

- **Map Image:** This is where you upload a graphic to be used for the new Map and serve as the background of the map. To upload a graphic for use as the map image, click the [+] sign next to the Map Image field.

Creating and Using Map Hot Spots

After an image has been uploaded, the image appears in the right pane with the **Hot Spot Tools** control panel above it. Hot Spot Tools allow you to configure interactive elements for your map. From left to right, these tools enable you to:



Select & Edit

To select an element that has been added to your map image, click the pointer tool and then the object. The outline of the shape is highlighted and drawing points visible at corners.

xxx-yyy	DRAFT 214	7/2/2015
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Draw Polygon or Rectangle

To create a new shaped Hot Spot element on the map image, click the shape tool and then click-and-drag the desired shape placement. Use the second icon from the left to create a rectangular hot spot. If you want to create a polygonal hot spot (that is, one that is not rectangular), then click the third icon from the left (the one immediately to the right of the square/rectangle).

Place a Reference Point

To create a hot spot reference without creating a hot spot shape, click this tool and then click the map to place.

Duplicate a Shape

The Duplicate Shape tool allows you to copy and paste a shape from one you have previously drawn. To duplicate a shape, select the shape and click the button.

Draw the Map Attributes Box

A Map Attributes box displays various attributes about the map, and will resize in proportion with the image when being viewed.

Move Forward, Backward, to Front, or to Back

Move selected items in front of or behind the preceding item, or before or behind all other items.

List Hot Spots

The List Hot Spots tool prompts box that lists all of the hot spots you have created. To view the List of Hot spots, select the List Hot Spots tool.

Show Hot Spot Info

The Show Hot Spot Info tool turns on a rollover function that allows hot spot info to be seen in the Map Editor pane when you rollover the hot spot. The function can be turned on by clicking on the button and turned-off by again clicking on the button.

Delete a Shape

To delete a shape, click the Select & Edit tool from the Hot Spot tool palette, then click on the shape that you would like to delete. Click the Delete Shape tool.

xxx-yyy	DRAFT 215	7/2/2015
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Hot Spot Settings Task Pane: Configuration

- **Hot Spot Target:** Choose the type of target for the hot spot drawn (location, asset, text or URL). The hot spot attributes that will display in the reference box will relate to the target that is chosen and will also link to that location, asset or URL when the hot spot region is clicked upon in the map in the User Console. This will not be the case for the text target type. The text target type cannot hold attributes or be a hot link.
- **Location/Asset/Text/URL:** Depending on the type of hot spot target that is chosen this field will vary. If a location target is chosen this field will require you to select a location to scope to from within the tree and will optionally allow you to choose a different map family than the map family currently being viewed. If an asset target is chosen this field will require you to select an asset from your assets list. If text is chosen, this field allows you to add any text to the map, but will not hold any attributes or be a hot spot. If a URL target is chosen, this field will require you to input a URL to connect to and optionally will allow you to apply a label to this URL.
- **Data Box:** Choose between None, Visible or Include Hover. If Include Hover is chosen, the text that would normally display only when the user hovers the mouse over the hot spot will instead display on the map.

Hot Spot Settings Task Pane: Display

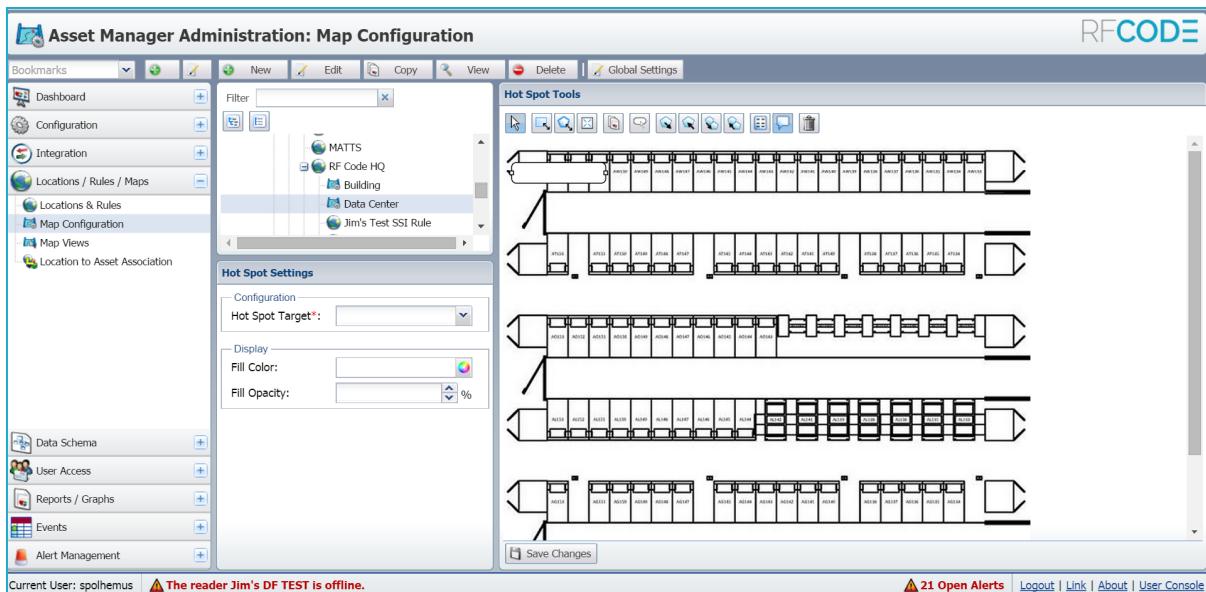
- **Fill Color:** Choose a fill color for the hot spot shape that has been drawn. If you do not specify a fill color this setting will default to the Fill Color setting specified in your map's settings. If your map's settings do not have a fill color specified then the fill color will default to the Fill Color setting found in "Global Settings."
- **Fill Opacity:** Specify an opacity percentage that you would like for the fill area. The lower the percentage the more transparent the fill area will appear. For example a specification of 100% for this field will make the fill area completely opaque. If you choose not to specify a percentage for this field, this setting will default to the Fill Opacity setting specified in your map's settings. If your map's settings do not have a fill opacity specified then this setting will default to the Fill Opacity setting found in "Global Settings."

TIP: The width of the hot spot data box will change relative to the scale and/or contents when viewing the map. The size of the data box shown when editing is the “Max width” when viewing the map image at 100%, meaning that depending on what text is being displayed, the data box may appear smaller than the width specified, but it will not grow wider than the width specified.

Using Multiple Hot Spot Types on a Map

Although maps are generally separated by function, that is one map might show sensor readings/summaries and another might show a geographical click-through based on larger to smaller geographical area, you can include both types on the same map.

In the example below, one hot spot points to a Rack Location (one specific rack in a row of racks), which then drills down to another map that shows individual temperature sensors, each of which represented by its own hot spot on the destination map. Notice the hot spot overlay on the map, and the Hot Spot Settings pane in the lower middle frame.



In this next example, a Hot Spot has been created for a different rack, but instead of allowing a click-through to the individual rack location, this Hot Spot shows the average intake temperature of the rack as a whole. This is done by pointing to the Summary Asset for the rack because, by default, the Summary Asset provides an aggregate of all sensor readings associated with the rack.

After the map is saved, switch over to the **User Console** and navigate to **Maps**.

Navigate to the desired map using the **Location** drop-down menu. Within that location, you can choose a specific map from the **Map** drop-down menu. The other options available to you allow you to change the View, Attribute, and/or Attribute Formatting. For more information about conditional formatting based on Attributes, refer to the Attribute Formatting section.

Hovering over the respective hot spots in the map view will reveal additional information about the hot spot target (for example, environmental conditions for a rack). This can be turned off and/or modified in the “View” configuration of the map.

Map Views

Map Views let you define how you want information in Asset Manager to be displayed visually and also what information will be displayed. A Basic Map View is included by default. There is no limit on the number of Views that can be created.

Basic Information

Name*:	<input type="text"/>
Description:	<input type="text"/>

Map Configuration

Map Attributes:	<input type="text"/>
Copy Down	
Hot Spot & Hover Attributes:	<input type="text"/>

Groups

Allowed User Groups:	Everyone
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Create a Map View

1. Navigate to **Locations/Rules/Maps > Map Views** and click the **New** button. The Map Views sub-task pane appears.
2. Complete all required and any additional desired fields.

Basic Information

- **Name:** Enter a name for the Map View.
- **Description:** Enter a description of the Map View. This is an optional field.

Map Configuration

- **Map Attributes:** Select the attributes that will display on a map in the Map Attributes Box. This attributes list will contain all the asset, status, custom or calculated asset attributes that you have created in Asset Manager. To select attributes, click on the attribute from the list and click the Right Arrow button to add it to the selected attributes list. You can organize the

xxx-yyy	DRAFT 219	7/2/2015
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order of appearance for these attributes by clicking the Up and Down Arrow buttons. Click **OK** when finished.

- **Hot Spot & Hover Attributes:** Select the attributes that will display when the user places the pointer within the Hot Spot area on a map.

This attributes list will contain all the asset, status, custom or calculated asset attributes that you have created in the Asset Manager. To select attributes, click on the attribute from the list and click the Right Arrow button to add it to the selected attributes list. You can organize the order of appearance for these attributes by clicking the Up and Down Arrow buttons. Click **OK** when finished.

Groups

- **Groups:** Click the Ellipsis ... button to select from available groups. Click **OK** when finished.

TIP: If you would like the attributes to display exactly the same for the Hot Spot & Hover attributes as you have specified for the Map Attributes, click the **Copy Down** button.

4. Click **Save Changes** to save the Map View. The new Map View appears in the list to the left.

Copy a Map View

Copying a map may be faster than creating a new map if there are few attribute differences.

1. Select map to be copied.
2. Click **Copy**.
3. Edit settings as desired.
 1. Click on an ellipsis [...] button to open the selection dialog. Make changes to selections and click **OK**.
4. Click **Save Changes**. The new Map View appears in the list to the left.

xxx-yyy	DRAFT 220	7/2/2015
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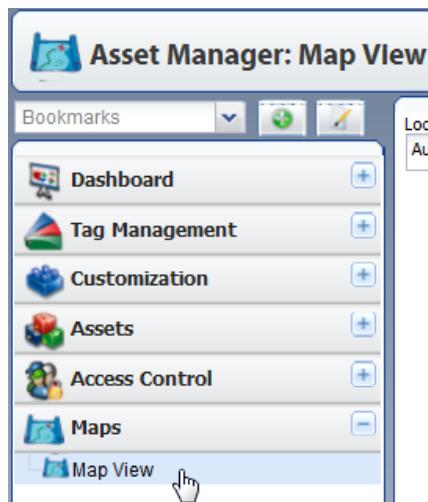
Delete a Map View

A Map View can be deleted at any time. Deleting a Map View does not delete any maps that have been created.

1. Select the Map View to be deleted.
2. Click the **Delete** button.
3. A popup box asks you to confirm this action. Click **Delete** to confirm the deletion.

Map Views in the User Console

Map Views are available to different Users in the User Console depending on how they are configured in the Admin Console.



Use the drop-down menus to select the desired Location, Map, View, Attribute, Zoom, Alert Severity, and/or Attribute Formatting.



Asset Manager: Map View

Search

RF CODE

Bookmarks [dropdown]

Dashboard [+]

Tag Management [+]

Customization [+]

Assets [+]

Access Control [+]

Maps [+]

Map View [+]

Location: RF Code HQ Map: Data Center View: Rack Environment Attribute: Name Zoom: 100% Minimum Alert Severity: None Attribute Formatting: Off

Reports / Graphs [+]

Events [+]

Alert Management [+]

Save as Image [button]

Profile: spolhemus [dropdown]

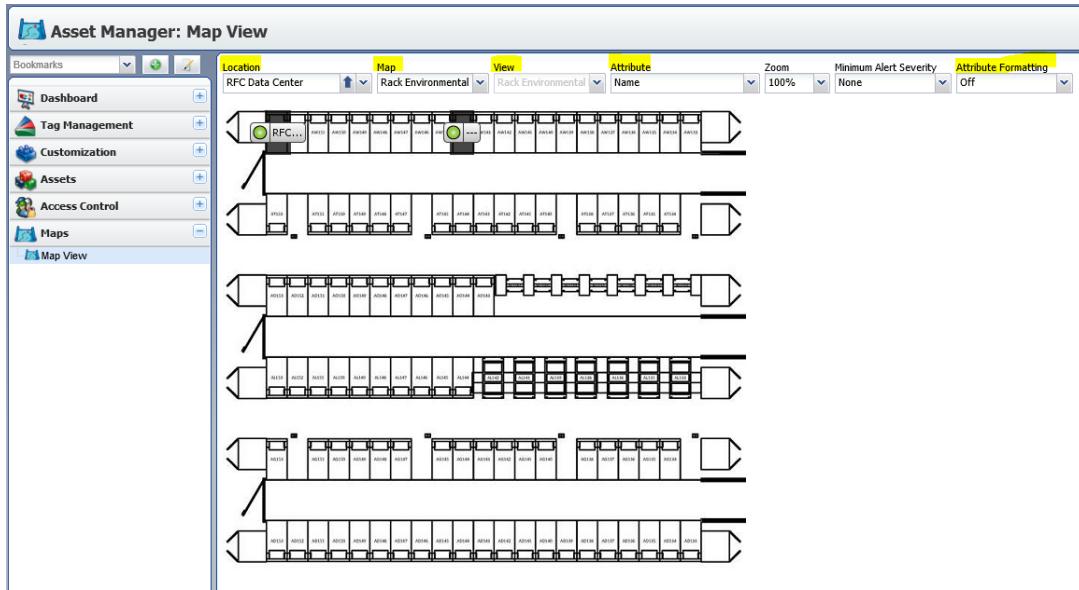
Low battery has been detected for the tag associated with asset Jim's Place - Inside.

280 Open Alerts [button]

Logout | Link | About | Admin Console

- Location
 - Map
 - View
 - Attribute
 - Zoom
 - Minimum Alert Severity
 - Attribute Formatting

Using Map Views, the map's creator, Systems Administrator, or another user with sufficient access can change which Attribute will be shown for any particular Hot Spot and whether or not the information will be shown to users by default or whether the information will remain hidden until a user hovers over it with the mouse pointer.



Dashboards

A dashboard is a customizable visual display used to manage assets and monitor system health in real-time.

A System Status dashboard is configured by default, and appears in the task pane visible to every user. Additional standard and custom dashboards are available depending on the permissions granted to a user by the systems administrator.

Overview of Dashboards

Dashboards are customizable groupings of widgets, which let you monitor attributes visually. One or more widgets can be configured in a dashboard that will then show the information you have selected in easy to understand bars, dials, grids, graphs, or lists. There is no limit to the number of dashboards that can be created.

The table below lists widgets that can be included on a dashboard. As a best practice, include no more than four widgets on a single dashboard.

Widget	Description
Users Online	Lists all users that are logged into to your Asset Manager system. Users are grouped by role (Administrator, Manager, Editor, Reporter, Reporter with Alerts & Events, Viewer). The list of users can be collapsed or expanded as needed. Included in default dashboard.
System Configuration	Lists the minimal required configuration tasks and indicates the configuration status of the task. The configuration task for each of the tasks can be accessed by double-clicking on the various task lines. Included in default dashboard.
Offline Zone Managers	Displays a summary of Zone Managers that have been configured for use in the Asset Manager system. It lists the number of Zone Managers and indicates their status, whether they are online or offline. An administrator can access the Zone Manager Status Configuration sub-task by double-clicking on the Zone Managers line in this pane. Included in default dashboard.
Offline Readers	Displays a summary of Readers that have been configured for use in the Asset Manager system. It lists the number of Readers and indicates their status, whether they are online or offline. The Reader Status Configuration sub-task can be accessed by double-clicking on the Reader line in this pane. Included in default dashboard.
Alerts Past Week	Displays a bar graph of the number of alerts that have occurred for each day during the last week time period.
Asset Grid	Displays one or more attribute values in a grid table.
Bar Chart	Displays a single attribute value for one or more assets in a bar chart graphic.
Dial	Displays a single attribute value for one asset in a dial format. The dial allows for upper and lower boundary settings with a pointer indicating the current reading level on the dial.
Graph	Displays a single attribute value for one or more assets in a line graph format.

Widget	Description
	The graph's time period and refresh interval are configurable and the graph is up-dated dynamically.
Horizontal Bar	Displays a single attribute value for one asset in a horizontal bar format. The bar widget allows for upper and lower bounds configuration to be set.
LCD Display	Displays a single attribute value for one asset in a LCD style text display.
LCD Display with LED	Displays a single attribute value for one asset as an LCD style text display along with an LED light indicator in an On or Off state. The state of the LED to On or Off is configured to be determined by a logical operation on the attribute value being displayed. Example: When Temperature is greater than 100, show a lighted LED state.
LED Dial	Displays a single attribute value for one asset in an LED dial format. The dial allows for upper and lower boundary settings. The center of the dial has an LCD text style display showing the current value of the attribute being displayed.
Open Alerts	Displays a table of all the alerts currently in the open state. The table lists the Alert Start Time, Severity and the Alert Message description. The widget displays multiple pages in cases where multiple alerts listed are greater than a single page. Double-clicking on any one of the listed alerts will open an Alert Information dialog displaying the extended alert information.
Single LED	Displays an LED in an On or Off state. The LED state is determined by a logical operation on one attribute of a single asset. Example: When a Door state is equal to Open, show a lighted LED state.
Text Widget	Displays user-configured text on the dashboard. The text widget can be configured to be aligned left, right or centered.
Vertical Bar	Displays a single attribute value for one asset in a vertical bar format. The bar widget allows for upper and lower bounds configuration to be set.

Create a Dashboard

To create a basic Dashboard, perform the following steps:

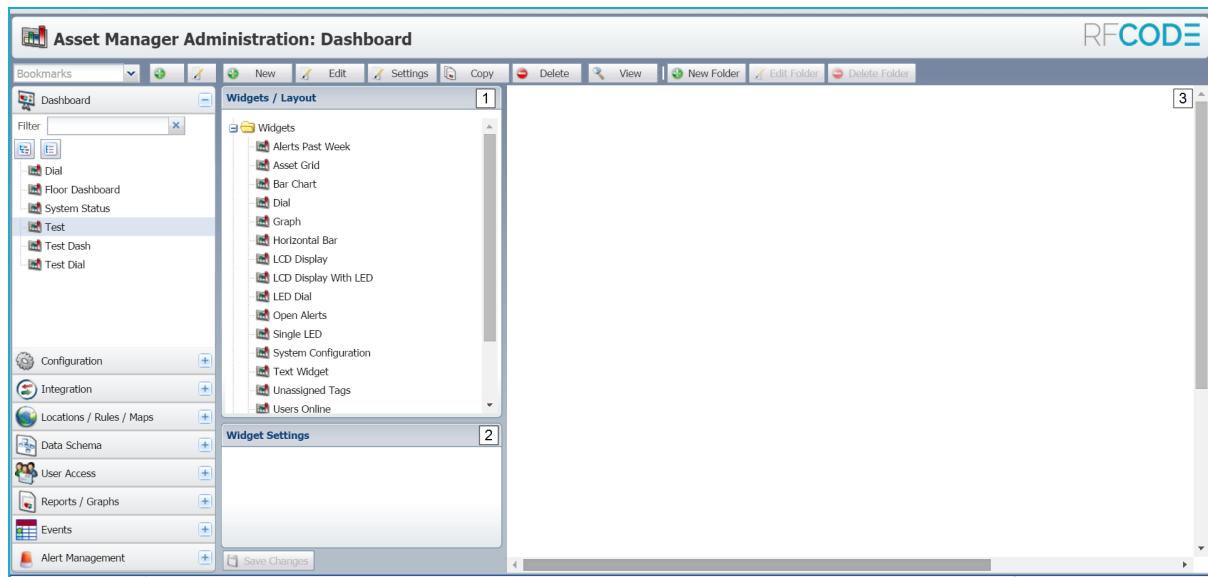
1. Navigate to **Admin Console > Dashboard** and click the **New** button.
2. In the Create: *Dashboard* dialog box, complete all required and any desired additional fields.



3. After you have entered the required information and configured the general Dashboard settings and/or optionally configured the Groups function (see Security section of this document for more information) for this dashboard, click the **OK** button to save.

The main dashboard customization pane appears. There are three main areas, the widget/layout selection pane, the dashboard preview pane and the widget settings pane.

xxx-yyy	DRAFT 226	7/2/2015
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1	Widgets/Layout	Expandable lists include two layout options and all available widgets. Drag an item from the list to the preview pane to select.
2	Widget Settings	Define the asset, attribute, operators and values for the widget, and the display settings for the widget including conditional behaviors.
3	Dashboard Preview Pane	Place your widgets where desired on the dashboard.

4. Select a Layout.

Collapse the Widgets folder or scroll down to the bottom of the Widgets/Layout pane to reach the Layout folder. Drag the Blank or Table layout to the Dashboard Preview Pane.

Blank: Choosing this layout option and dragging it to the Dashboard Preview Pane will place a blank box as the layout for the dashboard. The borders of this box can be manipulated by dragging the edges along the width or the height. More than one blank box can be placed on the Dashboard. Multiple widgets can be placed in one blank layout box. Blank layout boxes can also be used to create borders or blank spaces in the dashboard as well.

A Blank layout box can be removed from the Dashboard Preview Pane by right-clicking and selecting **Delete**.

Table: Choosing this layout option and dragging it to the Dashboard Preview Pane will prompt a Grid Row/ Columns box where the number of rows and columns for the table will be selected. Once the number of row/ columns desired are entered, a blank table will appear in the Dashboard Preview Pane. The borders of this table can be manipulated by dragging the edges along the width or the height. More than one table can be placed in a Dashboard and tables can be placed within cells of another Table in the Dashboard.

A table can be removed from the Dashboard by right-clicking and selecting the **Delete table** option.

NOTE: If no layout is selected, the dashboard uses a single blank box. Widgets will stack vertically in increasingly smaller sizes, the first widget taking up half the available space, the second half of what remains, and so on until the space is too small to support additional widget placement.

5. Select one or more Widgets.

Select the widget(s) desired from the Widgets/Layouts tree and drag to the Dashboard Preview Pane. Add as many or as few of the widgets that you desire to create your customized Dashboard.

NOTE: Dials and LEDs appear in the preview pane as Unassigned. Graphs and Bar Charts do not appear in the Preview Pane at all. To view these widgets, define their settings and click **View** to view the dashboard in a new browser tab. To determine whether or not a box in the dashboard preview pane contains a widget that is not visible, click that box. The Widget Settings box remains empty if no widget has been placed.

6. Define Widget Settings. The Widget Settings pane appears when you drag a widget to the Dashboard Preview Pane. Select the Asset and Attribute to display in your custom dashboard. Configure the visual display features such as color, borders, title, fonts, etc. When you have the widget settings configured, click the **Save Changes** button to save the settings.

NOTE: The table views of the dashboard can be customized to display or not display specific columns in the table views either through configuring with the widget settings or through the process described in the following. To hide any of these columns, click on the right side of the column where a menu arrow will appear. Scroll down to the Columns item and uncheck any of the columns that you would like to hide. You can also sort these columns in ascending or descending order alphabetically. The preferences that you establish for the setup of your table views and dashboard configuration are automatically saved and will appear in the manner you have established each time you login.

User Accounts and Security within Asset Manager

A unique User ID must be created for each person using Asset Manager. A Systems Administrator can set the level of access each user has to information in Asset Manager. Security configurations can be made at the user, group, or asset level.

User Roles define the overall level of access a user has to the system: view, create, edit, or manage. Groups can be used to set the locations or asset attributes multiple users will be able to view, or the access levels they have with regard to certain locations or asset attributes. Asset Links allow system administrators to control the items available to users in the Assets task.

Security in Asset Manager is achieved through the addition and configuration of Roles, Groups, Permissions, and some Advanced Asset Security options for User accounts.

User Accounts, Roles, and Permissions

Asset Manager includes six designated User Roles: Asset Editor, Asset Manager, Asset Reporter, Asset Reporter with Events & Alerts, Asset Viewer, and System Administrator. The six Roles have different levels of access to different features and functions within Asset Manager.

xxx-yyy	DRAFT 229	7/2/2015
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A User Role can be assigned when a User account is created, or at any time by editing a User account. The following are brief descriptions of the six User Roles and the level of access for each, presented in order of least access to most access within Asset Manager:

- **Asset Viewer:** Asset Viewers have the ability to view information about Assets, to run Reports, to export data, and to execute searches for Assets and other information about conditions in the environment.
- **Asset Reporter:** Asset Reporters have all of the abilities of Asset Viewers and also have the ability to create, edit, and delete Reports and Graphs.
- **Asset Reporter, Alerts & Events:** Asset Reporters with Alerts & Events permissions have all of the abilities of the Asset Reporter Role and also have the ability to view and acknowledge system-generated Alerts.
- **Asset Editor:** Asset Editors have all of the abilities of Asset Reporters and also have the ability to add and edit Assets, create and edit Dashboards, and associate Assets to tags.
- **Asset Manager:** Asset Managers have all of the abilities of Asset Editors and also have the ability to edit Asset Attributes.
- **System Administrator:** Users with the System Administrator Role have access to all of the functions in both the Administrator Console and the User Console.

NOTE: For more detailed information about the specific Tasks that are enabled or disabled for each Role, refer to the [User Role Matrix](#) in the Appendix.

Adding Users

Users can be created within Asset Manager or imported from LDAP/Active Directory if using. Security settings can be applied when user accounts are created or at any time thereafter.

Create a User Account

1. Access the **Admin Console**.
2. Click **Security > Users**.

xxx-yyy	DRAFT 230	7/2/2015
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4. Complete all required and any desired additional fields.

User Information

- **Enabled:** Check this box to activate the user account.
- **Name:** Assign a User Name.
- **LDAP User:** will be checked by default if users imported from LDAP.
- **Password:** Use this for Users created and managed within Asset Manager that are not authenticated by LDAP.
- **Confirm Password:** Enter the password again to confirm it.
- **Full Name:** The User's full name.
- **Email Address(es):** Enter the User's email address.
- **Expiration Date:** Set this to make a User account inactive on some future date.

Region Settings

- **Units Display:** Choose an option in this drop-down menu to define how the user will see units of measurement and time:
 - **Browser/OS Locale:** The user's settings will be inherited from their local web browser settings.
 - **English:** Asset and Sensor Attributes will appear as those of the imperial or English (USA) systems of measurement, that is, ounces, feet, temperature expressed in Fahrenheit, etc.
 - **Metric:** Asset and Sensor Attributes will be displayed in the metric system, that is, grams, meters, temperature expressed in Celsius, etc.
- **Time Zone:** Use this to set the time zone for the User. By default, this is set to Browser/OS Locale, but you can manually change it to hard code the time zone by choosing a time zone from the drop-down menu.

xxx-yyy	DRAFT 231	7/2/2015
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Asset Links

- **Asset Links:** Click the Ellipsis ... button to select Asset Links this user will see on the Assets menu.

User Groups

- **User Groups:** After these have been created, you can assign one or more Groups to each User account in order to allow the User to inherit traits assigned to the Group(s).
- **User Groups For New Assets:** Select **Same As User Group Membership** or click the Ellipsis ... button to select the specific group-level permissions this user will have for new assets.

NOTE: A User can be assigned to a User Group even if Advanced Security is not enabled on the Asset Manager server; however, the assignment of Users to Groups enables advanced functionality only if Advanced Security is enabled. To configure Advanced Security settings, go to:

Configuration > Server > Asset Security. For more information about Advanced Security, refer to the [Advanced Security](#) section. Do not change the Advanced Security settings without first consulting RF Code Support.

Overview of Groups

Using Groups either with [LDAP](#) or Advanced Asset Security, you can grant and restrict access to Asset Links and Views, as well as various areas and items within Asset Manager, such that every User in a particular Group can only see the specific assets and/or attributes in the system permitted to that Group. This gives you the ability to provide varying degrees of access control. Access Control Groups can be set to provide permission to or restriction from any of the following parts of the Asset Manager system:

- Alert Actions
- Alert Thresholds
- Asset Builder Jobs

xxx-yyy	DRAFT 232	7/2/2015
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- Assets
- BIRT Templates
- Custom Types
- Event Actions
- Event Triggers
- Graphs
- Locations
- Maps
- Map Views
- Reader Serial Devices
- Reports
- Report & Graph Actions
- Report & Graph Output
- Templates
- Tag Groups
- Views
- Unassigned Tags
- User Dashboards

NOTE: In order to make use of Group-level permissions and inheritance, you must enable Advanced Asset Security. For more information, refer to the [Advanced Security](#) section in the Appendix. When the Security feature is enabled, all Users must be members of some Group other than the default Everyone Group. If they are not, they will not be able to log in to Asset Manager. If they attempt to do so, they will be prompted with a message that their account is locked. However, one quick way to prevent Users from being locked out is to make

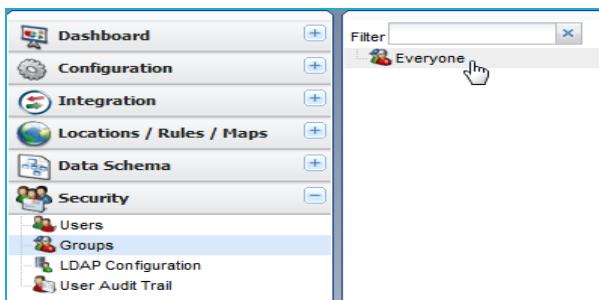
xxx-yyy	DRAFT 233	7/2/2015
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a copy of the Everyone group and assign to it all Users who are not assigned to any other Group.

Creating Groups

To define Groups to which Users can be assigned, follow these steps:

1. In the **Admin Console**, go to **Security > Groups**.



NOTE: The “Everyone” Group is the default Group in the Group tree; it encompasses all Users that have been created in Asset Manager and exists to provide a single common Group available to all Users by default.

2. Click the **New** button.

Configuration fields will appear for the new Group in the right pane.

Basic Information

Name * :	<input type="text"/>
Description:	<input type="text"/>

Asset And User Console Object Access

Unrestricted Access To Assets And User Console Objects:	<input type="checkbox"/>
---	--------------------------

Everyone Group Access

Can Assign Assets To The Everyone Group:	<input type="checkbox"/>
--	--------------------------

Locations And Custom Types

Allowed Location And Custom Types:	<input checked="" type="radio"/> All Location And Custom Types <input type="radio"/> Allowed Location And Custom Types <input type="button" value="..."/>
------------------------------------	---

Attributes

Allowed Restrictable Attributes:	<input checked="" type="radio"/> All Restrictable Attributes <input type="radio"/> Allowed Restrictable Attributes <input type="button" value="..."/>
----------------------------------	---

3. Complete all required and any desired additional fields.

Basic Information

- **Name:** The name of the new Group.
- **Description:** The description of the Group.

Asset And User Console Object Access

- **Asset And User Console Object Access:** This checkbox determines if the Group has visibility to all assets. If the box is checked, the User can see all assets regardless of Group membership. If the box is *not* checked, the User can only access assets that have the Group name associated with these assets.

xxx-yyy	DRAFT 235	7/2/2015
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Everyone Group Access

- **Everyone Group Access:** Specifies whether or not the User can create assets that everyone can access.

Asset Links

- **Asset Links:** Click the Ellipsis ... button to select from available asset links. Click **OK** when finished.

Locations And Custom Types

- **Allowed Locations And Custom Types Access:** Determines if the Users can see all Locations and Custom Types or only selected Locations and Custom Types.

Attributes

- **Allowed Restrictable Attributes:** Determines if the User can see all attributes of an asset or not. If the User is not granted access to all attributes, then the User can see all non-restricted attributes and only the restricted attributes that are granted to this User. All other restricted attributes are hidden.

4. Click **Save Changes**.

The new Group appears in the left column. Any User assigned to this Group will be allowed access to all things to which the Group has access.

NOTE: Permissions are cumulative. Users have access to anything in Asset Manager that is permitted by any Group to which that User has been assigned. This means that if a User belongs to two Groups and one Group has access to certain parts of the system that are prohibited to the other group to which the User belongs, then the User will have permission to see those things.

Do not add a User to a Group that provides an access level greater than you intend for that User.

xxx-yyy	DRAFT 236	7/2/2015
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Access Control

To further restrict visibility of assets and sensors, you can go to the Access Control feature to limit what assets/sensors are seen by different Groups.

Access Control allows users who are assigned an Asset Manager or Asset Editor Role to change User access to an asset or sensor after it is created. Access Control allows Asset Managers and Asset Editors to assign Groups to Assets and to other User Console objects in the system, such as Reports, Graphs, Alerts, Thresholds, Views, Maps, etc.

NOTE: Access Control does not appear in the task list for Asset Managers or Asset Editors if Security is enabled. Also, if an Asset Manager or an Asset Editor is a member of only one Group and that Group cannot assign Assets to the Everyone Group (the default group where its member can see all assets/sensors), then neither does the Access Control task appear for them.

Information presented in Access Control is reported in real-time; all sensor and location data changes automatically as soon as Asset Manager receives any updates from the tags. A user can select the **Pause Updates** button to stop the view from being updated dynamically if a current snapshot of asset state is needed. The **Resume** button will be presented to enable automatic updating again. The dynamic filter allows users to narrow the list of assets/objects by Type, Location, Status, Attribute, Attribute Value, or any combination of these. There are four ways to manipulate assets within the Access Control panel: Edit Groups, Add Groups, Remove Groups, and View functions.

To enable a Group and the Users within it to have access to a specific asset (and information about it), perform the following steps:

1. In the **User Console**, go to **Access Control** and click the **Access Control** sub-task.

xxx-yyy	DRAFT 237	7/2/2015
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Asset Manager: Access Control

Type	Location	Status	Attribute	Operator	Value
Asset	All	Active			
Name	Asset Type	Description	Allowed User Groups		
Air Pressure Sensor 1	Differential Pressure				
Air Pressure Sensor 2	Differential Pressure				
Air Pressure Sensor 3	Differential Pressure				
Air Pressure Sensor 4	Differential Pressure				
Air Pressure Sensor 5	Differential Pressure				
Austin Data Center	Data Center				
CRAC 1	CRAC Unit				

- Click the **Edit Groups** button.

You will be prompted with the Group Membership window.

The Group Membership dialog box is open, showing the Available and Selected groups for the selected asset.

Type	Location	Status	Attribute	Operator	Value
Asset	All	Active			
Name	Asset Type	Description	Allowed User Groups		
Air Pressure Sensor 1	Differential Pressure				
Air Pressure Sensor 2	Differential Pressure				
Air Pressure Sensor 3	Differential Pressure				
Air Pressure Sensor 4	Differential Pressure				
Air Pressure Sensor 5	Differential Pressure				
Austin Data Center	Data Center				
CRAC 1	CRAC Unit				
CRAC 2					
Dell Server - 1					
Dell Server - 10					
Dell Server - 100					

Group Membership

Available	Selected
Filter <input type="text"/> Everyone	Filter <input type="text"/>
<input type="button"/> →	<input type="button"/> ←
<input type="button"/> OK <input type="button"/> Cancel	

- Select one or more Groups that will have access to information about the Asset and then click the **Right Arrow[→]** button to move the Group from the Available side to the Selected side.
- Click **OK** when finished.

The Group you selected will appear in the row for that Asset in the Allowed User Groups column.

The screenshot shows the 'Asset Manager: Access Control' interface. On the left is a sidebar with icons for Dashboard, Tag Management, Customization, Assets, and Access Control (which is selected). The main area has a table titled 'Assets' with columns: Type, Location, Status, Attribute, Operator, and Value. A secondary table below it lists 'Name', 'Asset Type', 'Description', and 'Allowed User Groups'. The 'Allowed User Groups' column for the last row, 'Austin Data Center', contains the value 'Everyone', which is highlighted with a red box.

Name	Asset Type	Description	Allowed User Groups
Air Pressure Sensor 1	Differential Pressure		
Air Pressure Sensor 2	Differential Pressure		
Air Pressure Sensor 3	Differential Pressure		
Air Pressure Sensor 4	Differential Pressure		
Air Pressure Sensor 5	Differential Pressure		
Austin Data Center	Data Center		Everyone
CRAC 1	CRAC Unit		

NOTE: While the use of Access Control enables the granularity of allowing and restricting views of assets to Groups of Users, it does require some administrative overhead because you must then manually enable all new assets and/or sensors that are added to a location so that they can be viewed by the necessary Group(s).

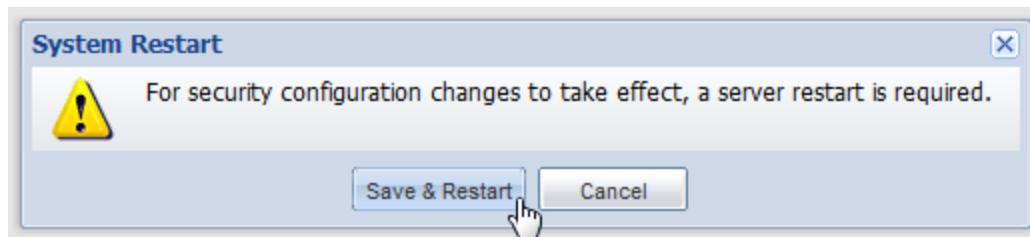
Advanced Asset Security

Advanced Asset Security lets you give certain Users the ability to restrict Asset views to different Groups of Users based upon Location.

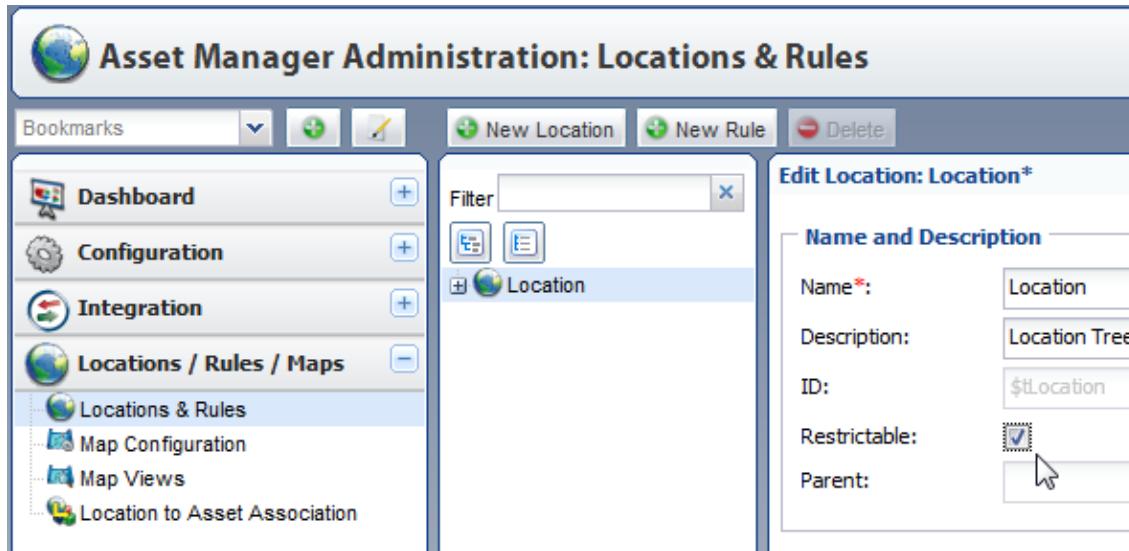
To enable Advanced Asset Security, perform the following steps:

1. In the **Admin Console**, go to **Configuration > Server**.
2. Select the **Enable Advanced Asset Security** checkbox.
3. Click **Save Changes**.

You will be prompted with a System Restart pop-up window.



4. Click the **Save & Restart** button.
The Asset Manager service will restart.
5. Log back into Asset Manager.
6. In the **Admin Console**, go to **Locations/Rules/Maps > Locations & Rules**.
7. Highlight the root **Location** in the tree.
8. Click to check and enable the **Restrictable** checkbox.



9. Click the **Save Changes** button.

Asset Links

Asset Links are filtered Views added to the Assets menu to simplify and streamline navigation.

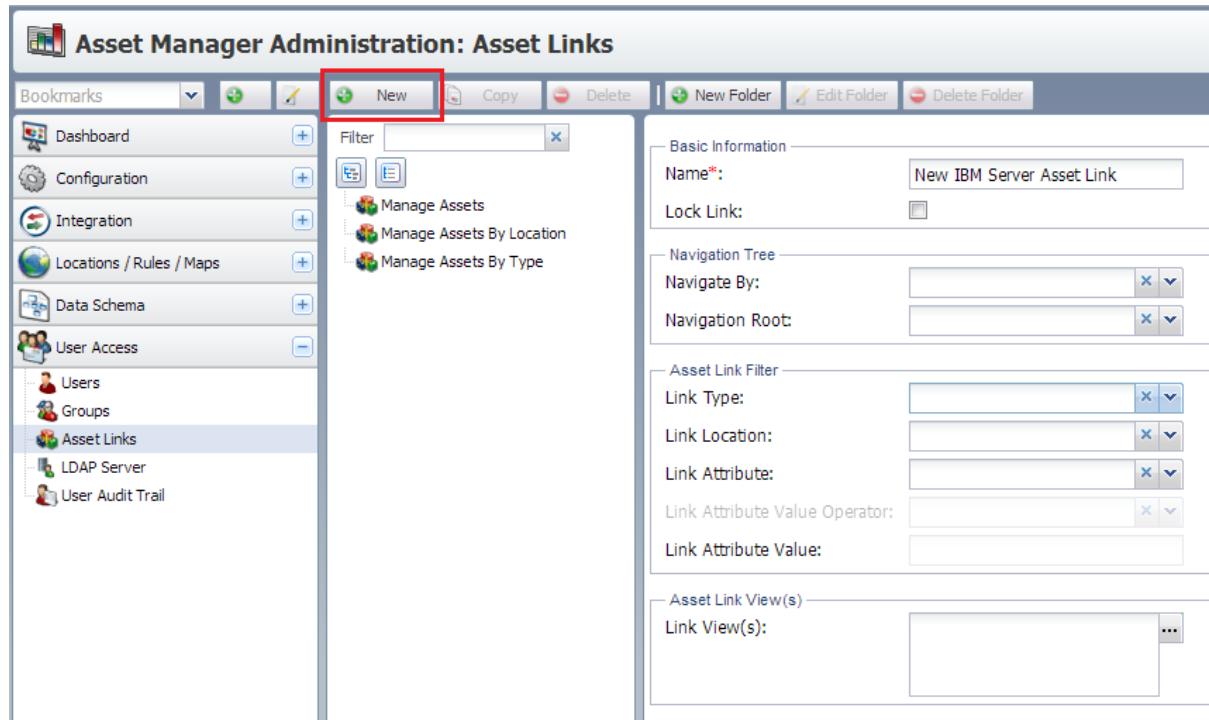
Created by the system administrator, Asset Links can be made available to all users, and can be used to restrict the data visible to specified user groups. Locking an Asset Link prevents users other than those with system administrator access from making changes to the link, though not to any assets reached by using that link. Asset Link View allow for specific custom views to be applied/restricted/allowed for the Asset Link. An Asset Link must be created before an Asset Link View can be customized.

xxx-yyy	DRAFT 240	7/2/2015
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By default there are three Asset Links which in previous versions of Asset Manager were not able to be modified or deleted. Asset Manager also includes several [Standard Asset Link Views](#) that can be selected by a Systems Administrator and are then available to users with the appropriate permissions.

To create a new Asset Link

1. Navigate to **Admin Console > Customization > Asset Links**. Click **New**.



The screenshot shows the 'Asset Manager Administration: Asset Links' interface. On the left, a navigation tree includes 'Dashboard', 'Configuration', 'Integration', 'Locations / Rules / Maps', 'Data Schema', and 'User Access' (with 'Asset Links' selected). The main area has tabs for 'Basic Information', 'Navigation Tree', 'Asset Link Filter', and 'Asset Link View(s)'. The 'Basic Information' tab is active, showing fields for 'Name*' (set to 'New IBM Server Asset Link') and 'Lock Link' (unchecked). The 'Navigation Tree' tab shows dropdowns for 'Navigate By:' and 'Navigation Root:'. The 'Asset Link Filter' tab contains dropdowns for 'Link Type:', 'Link Location:', 'Link Attribute:', 'Link Attribute Value Operator:', and 'Link Attribute Value:'. The 'Asset Link View(s)' tab shows a list for 'Link View(s):'.

2. Complete the required and any desired additional fields.

Basic Information

- **Name:** Assign a unique name that users will understand.
- **Lock Link:** Check this box to prevent users from modifying the filters for the link.

Navigation Tree

Defines filter information for the new Asset Link.

- **Navigate By:** Defines the class of object the filter will be based on.
- **Navigation Root:** Determines where in the hierarchy the filter will begin.

Asset Link Filter

- **Link Type:** Defines the type of Asset being filtered on.
- **Link Location:** Allows location-specific filtering if desired.

NOTE: Both the Link Type and Link Location are top-down in their functionality, where anything from the designated level on down will be included. All of the Asset Link Filter selections are optional, and with none specified users will have access/visibility to all assets. They are simply filtering options to restrict/limit the assets returned.

- **Link Attribute:** Select to filter by specific attribute.
- **Link Attribute Value Operator:** Select to filter by value equals, does not equal, in, attribute has value, or attribute has no value (is empty). Value: Select to filter by a specific value, either equals or does not equal.
- **Link Attribute Value:** Set to filter by a specific value.

Asset Link View(s)

- **Link View(s):** Click the Ellipsis ... button to access the list of available Asset Link Views. Move Views from Available to Selected as desired. Click **OK** when finished.
3. **Save Changes.** The Asset Link is available to all users until or unless the system administrator sets restrictions to manage access to Asset Links.

Enable a Standard Asset Link View

1. Navigate to **Admin Console > Customization > Asset Links**. Click **New**.
2. In the right pane, click the Asset Link View(s) ellipsis [...] button.

xxx-yyy	DRAFT 242	7/2/2015
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3. Double-click items listed in the left side, Available, to move them to the right, Selected; or click to select and use arrows to move items into and out of Selected. When finished, click **OK**. The Asset Link Views selected are available to all users until or unless the system administrator sets restrictions.

Manage Access to Asset Links and Asset Link Views

Access to Asset Links is set at the User or Group level.

1. From the **Admin Console > User Access** task, select the desired User or Group.
2. Click the Asset Links ellipsis [...] and move available Asset Links into or out of the Selected pane.
3. Click **OK** to save selection when finished.
4. Click **Save Changes** to update access for the User or Group.

Access to Views, including the Asset Links View, is set from the View Task, during or after creation of a View.

1. Navigate to **Admin Console > Views** and select a view to edit.
2. Click the Groups ellipsis [...] button and move available Groups into or out of the Selected Pane.
3. Click **OK** to save selection when finished.
4. Click **Save Changes** to update the Allowed User Groups for the view.

The Asset Link View(s) is a display designation that allows for specific custom views to be applied/restricted/allowed for the Asset Link. Views are defined and managed in the User Console under **Customization > Views**:

xxx-yyy	DRAFT 243	7/2/2015
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Asset Manager: Views

Basic Information

- Name: Server Asset View
- Description:
- Asset Types:

Available

- Activation Count #1
- Activation Count #2
- Activation Input #1
- Activation Input #2
- Active Alert Count
- Agent IP Address
- Airflow Position
- Alert Acknowledge Note
- Alert Acknowledged
- Alert Acknowledged By
- Alert Message
- Alert Repeat Message
- Alert Resolve Message

Selected

- Name
- Asset Tag
- System U Height
- Manufacturer
- Model
- Operating System

Groups

- Allowed User Groups: Everyone

Once the Asset Link is configured and saved, rights to use this Asset Link can be specified for respective users and/or groups of users in the Admin Console under the User Access section. For locally defined users, the Asset Link(s) are defined under the Users section:

Asset Manager Administration: Users

Bookmarks

- Dashboard
- Configuration
- Integration
- Locations / Rules / Maps
- Data Schema
- User Access
- Users
- Groups
- Asset Links
- LDAP Server
- User Audit Trail

Filter: admin

User Information

- Enabled:
- Name*: admin
- LDAP User:
- Password: (redacted)
- Confirm Password: (redacted)
- Full Name*: Local Administrator
- Email Address(es):
- Expiration Date:
- Roles*: System Administrator

Region Settings

- Units Display: Browser/OS Locale
- Time Zone: Browser/OS Locale

Asset Links

- Asset Links:
 - Manage Assets
 - Manage Assets By Location
 - Manage Assets By Type
 - New IBM Server Asset Link

For LDAP/externally defined users, modifying the respective user under the LDAP Server section:

Asset Manager Administration: LDAP Server

The screenshot shows the 'Asset Manager Administration: LDAP Server' interface. On the left, there's a sidebar with 'User Access' (selected), 'Users', 'Groups', 'Asset Links', and 'LDAP Server'. The main area has tabs for 'Permissions' and 'Server Configuration', with 'Permissions' selected. A red box highlights the 'Edit' button in the toolbar. Below it is a table of users with columns for 'User / Group', 'Role', and 'Asset Links'. A red box highlights the row for 'Wade Funk'. A modal dialog titled 'Edit: Ldap User' is open for Wade Funk. It has sections for 'User Information' (LDAP User: Wade Funk, Roles: System Administrator) and 'Asset Links' (Asset Links: Manage Assets, Manage Assets By Location, Manage Assets By Type, New IBM Server Asset Link). A red box highlights the 'Asset Links' section. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Once the Asset Links are defined, users can use and leverage the Links in the User Console under the Assets section. With any link selected, users can select Views to which they have access from the drop-down menu in the upper right portion of the screen, beneath the RF Code logo.

Asset Manager: Manage Assets

Search RF CODE

Type	Location	Status	Attribute	Operator	Value	Expected Location(s)	Actions
Asset	All	Active					
Low Battery	Name		Asset Type	Asset Tag	Asset Location		
	BeauTesting		Asset				
	Just another Asset		Asset				
	atest		Asset				
	test asset2		Asset				
	test asset3		Asset				
	Just an Asset		Asset				
	justatest		Asset				
	testing3		Asset				
	testing2		Asset				
	TEST BADGE TAG - JIM		Asset				
No	Asset Tag: RFCRCK00000020	IT Equipment	RFCRCK00000020	Unknown Location			
No	Asset Tag: TMPRCK99999991	IT Equipment	TMPRCK99999991	Unknown Location			
No	Asset Tag: RFCRCK00046021	IT Equipment	RFCRCK00046021	Unknown Location			
No	Asset Tag: RFCRCK00000021	IT Equipment	RFCRCK00000021	Unknown Location			

Pause Updates Default View
 Badge View
 Basic Envrios
 dates
 Default View
 Door Sensor View
 Expected Location
 GPS View
 Import view
 In Motion
 Jim 0-5V TEST VIEW
 Jim Demo
 Location / Online
 Location Change View
 Location vs. Previous
 Location

User Audit Trail

Asset Manager automatically records all changes made by all Users in the system. These include changes to the infrastructure (readers, tag groups, data schema, system upgrades, etc.) as well as changes to assets themselves. The User Audit Trail sub-task provides a facility to view this change history as well as to export the data.

- To view the User Audit Trail, navigate to **Security > User Audit Trail**.

Event Time	User	Description
2013-05-21 09:43:12	johndoe	Asset Created - Temperature - Humidity - - DC-ROW2-RACK1-TEMP-INTAKE (TEMPERATURE_HUMIDITY_7c7ac22b1f90561b)
2013-05-21 09:40:24	johndoe	Import Tags - All detected tags were added to the unassigned tag queue
2013-05-21 09:39:12	johndoe	User Login - johndoe - from remote address 10.1.9.115
2013-05-21 09:38:15	admin	User Created - System Administrator - - johndoe (\$tUser_e5003a0022dee2a2)
2013-05-21 09:27:12	admin	User Login - admin - from remote address 10.1.9.115
2013-05-21 07:48:00	admin	Location Created - Data Center - Row 2 - Rack 2
2013-05-21 07:47:44	admin	Location Created - Data Center - Row 2 - Rack 1
2013-05-21 07:47:30	admin	Location Created - Data Center - Row 2
2013-05-21 07:47:18	admin	Location Created - Data Center - Row 1
2013-05-21 07:47:08	admin	Location Created - Data Center
2013-05-21 07:40:21	admin	Dashboard Modified - System Dashboard - - System Status (\$tSystemDashboard_DEFAULT)
2013-05-21 07:40:12	admin	Dashboard Unretired - System Dashboard - - System Status (\$tSystemDashboard_DEFAULT)
2013-05-21 07:37:13	admin	License Key Created - License Key - (\$tLicenseKey_ec9dfe8a4e0c5198)
2013-05-21 07:36:35	admin	Tag Group Created - Treatment 04V Tag Group - - HUMRCK (\$zTagGroup_mantis04V_b14eca1d99c3ada9)
2013-05-21 07:35:21	admin	Tag Group Created - Treatment 04V Tag Group - - THSRCK (\$zTagGroup_mantis04V_39a3a099f9d429c3)
2013-05-21 07:35:08	admin	Tag Group Created - Treatment 04A Tag Group - - LOCATE (\$zTagGroup_mantis04A_d8dbc7e558fafd8b)
2013-05-21 07:34:55	admin	Tag Group Created - Treatment 04A Tag Group - - RFCLOC (\$zTagGroup_mantis04A_388d66e7069b1464)
2013-05-21 07:34:05	admin	User Login - admin - from remote address 172.16.1.102

- To display only a certain period, use the Date/Time filters and click **Go**.
- To Export, click the **Export** button.

NOTE: To show the audit trail only for a certain period of time, use the Date and Time filters and click **Go**.

The screenshot shows a search interface with two date pickers labeled 'From:' and 'To:', each followed by a time selector (9:00 AM and 10:00 AM). Below the date pickers is a 'Go' button with a hand cursor icon. Underneath the date pickers is a table header with three columns: 'Event Time', 'User', and 'Description'.

NOTE: To export the audit trail, click the **Export** button, choose a folder destination, and then click **Save**.

Integrating with LDAP / Active Directory

The following instructions will help you to configure Asset Manager to connect to an Active Directory or other LDAP server running on Microsoft Windows Server 2008 R2 or Windows Server 2012.

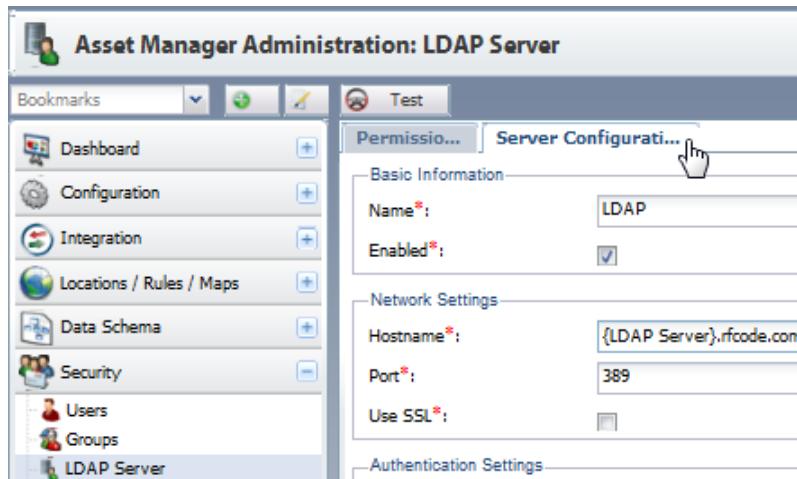
NOTE: As of Asset Manager v2.8, access to Asset Manager can now be granted based on LDAP Group membership. This means that users that have never logged into Asset Manager can do so without an Admin explicitly creating a User account. Instead, an Administrator can grant access to Asset Manager to an entire LDAP User Group, for example Asset Managers. Thus a new employee to the company can be granted membership to that User Group and therefore be granted login rights based solely on Group membership without any additional administration needed within Asset Manager. This lightens the load for the Asset Manager system Administrator, especially for installations with a very large User population.

LDAP Server Configuration

The LDAP Server sub-task is used to configure access to an LDAP server for User and Group account management. To configure LDAP for use with Asset Manager:

1. In the **Admin Console**, go to **Security > LDAP Server > Server Configuration**.

xxx-yyy	DRAFT 248	7/2/2015
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2. Complete all required and any desired additional fields.

Detailed view of the configuration fields:

- Basic Information:**
 - Name*: LDAP
 - Enabled*:
- Network Settings:**
 - Hostname*: example.com
 - Port*: 389
 - Use SSL*:

Basic Information

- **Name:** This can be any name you choose to call your LDAP server.
- **Enabled:** This must be checked in order for Asset Manager to access your LDAP server.

Network Settings

- **Hostname:** Enter the hostname name of your LDAP server.
- **Port:** Enter the port number over which you will connect to your LDAP server. In most cases this is port 389 which is the default for Active Directory.

NOTE: If you enable use of SSL, your port number will be 636 unless you have changed the default setting.

- **Use SSL:** Check this box if you have a signed certificate installed on your server. This will cause Asset Manager to communicate with your LDAP server using SSL.

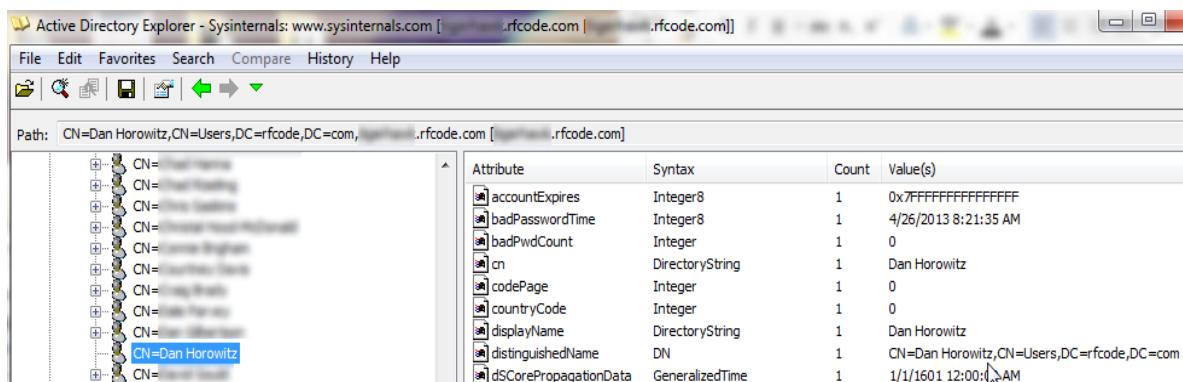
Authentication Settings>

- **Bind User:** Specify the User account who will perform bind requests to the LDAP server. To do so, you will need to enter information pertinent to tree path.

Authentication Settings

Bind User*:	<input type="text" value="cn=FirstName LastName,cn=Users,dc=rancode,dc=com"/>
Bind Password:	<input type="password" value="*****"/>
Confirm Password:	<input type="password" value="*****"/>

NOTE: Binding is the step where the LDAP server authenticates the client and, if the client is successfully authenticated, allows the client access to the LDAP server based on that client's privileges. The screenshot below shows a User in an LDAP/AD tree.



The screenshot shows the Active Directory Explorer interface. The left pane displays a hierarchical tree view of the LDAP directory structure, with one node labeled "CN=Dan Horowitz" highlighted. The right pane shows a detailed list of attributes for this user object, including accountExpires, badPasswordTime, badPwdCount, cn, codePage, countryCode, displayName, distinguishedName, and dSCorePropagationData. The distinguishedName attribute is listed as "CN=Dan Horowitz,CN=Users,DC=rancode,DC=com".

Attribute	Syntax	Count	Value(s)
accountExpires	Integer8	1	0xFFFFFFFFFFFFFF
badPasswordTime	Integer8	1	4/26/2013 8:21:35 AM
badPwdCount	Integer	1	0
cn	DirectoryString	1	Dan Horowitz
codePage	Integer	1	0
countryCode	Integer	1	0
displayName	DirectoryString	1	Dan Horowitz
distinguishedName	DN	1	CN=Dan Horowitz,CN=Users,DC=rancode,DC=com
dSCorePropagationData	GeneralizedTime	1	1/1/1601 12:00:00 AM

NOTE: The **Bind User** resides in the **Users** directory. Any user who has privilege to query the directory can be the Bind User. Users to be added must reside under the top level, which is known as the **Search Base**. The users could reside in sub-folders beneath the Search Base, but they must be somewhere within this hierarchy and not under a separate or parallel hierarchy. The **Search Filter** is typically pre-populated by the system and shouldn't be modified.

Depending on the size of your LDAP tree, you may need one or more of the following monikers when specifying the path in the tree:

- cn – common name
- ou – organizational unit
- dc – domain component

Example Simple Path: cn=Dan Horowitz, cn=users, dc=rfcode, dc=com

NOTE: The path must be specified in reverse order of the tree.

NOTE: The default naming convention for Active Directory is Lastname, Firstname. If you use the default naming convention, then you will have to use an escape character.

- **Bind Password:** The LDAP password of the bind user.
- **Confirm Password:** Type the bind user password again.

Query Information for LDAP Users	
User Search Base:	cn=Users,dc=rfcode,dc=com
User Filter:	(objectClass=person)
Search Filter:	(sAMAccountName={0})
User DN Attribute:	distinguishedName
Account Expiration Attribute:	accountExpires
Email Attribute:	mail

Query Information for LDAP Users

- **User Search Base Field:** In this field you will need to enter the path to the directory in the tree that contains the users that match the names of the users configured in Asset Manager.

NOTE: All LDAP users within Asset Manager must be within this search base.

Example Search Base Path: cn=Users, dc=example, dc=com

xxx-yyy	DRAFT 251	7/2/2015
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- **User Filter:** This is simply the object class for filtering the LDAP request for matching users.
- **Search Filter:** This field determines the field name for login id. It is populated by default in Asset Manager. If you are using Active Directory, this field should not be altered.
- **User DN Attribute:** This field is used to configure Asset Manager with LDAP servers other than Active Directory.
- **Account Expiration Attribute:** This is set so that user accounts can be expired programmatically based on a date. Do not change this field unless first contacting RF Code Support.
- **Email Attribute:** This defaults to “mail” and should not be changed.

— Query Information for LDAP Groups —

Group Search Base:	ou=Groups,dc=rfcode,dc=com
Group Filter:	(objectClass=group)
Group DN Attribute:	distinguishedName
User Membership Attribute:	memberOf

Query Information for LDAP Groups

- **Group Search Base:** In this field you will need to enter the path to the directory in the tree that contains the groups that match the names of the groups configured in Asset Manager.
- **Group Filter:** This is the object class for filtering the LDAP request for matching groups. The defaults are setup for Active Directory but can be modified if using another LDAP server.
- **Group DN Attribute:** This is the Distinguished Name (DN) of the LDAP group.
- **User Membership Attribute:** This defaults to “memberOf” and should not be changed.

NOTE: Frequently the same search base used for users can be reused for Groups.

xxx-yyy	DRAFT 252	7/2/2015
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3. After you have entered all of the fields correctly, click the **Test** button at the top left of the screen.

You will receive a message box that indicates that the LDAP server test was successful.



4. Click **Save Changes** to save your LDAP Settings.

You can now add LDAP Users and/or LDAP Groups to Asset Manager.

Adding LDAP Users and Groups

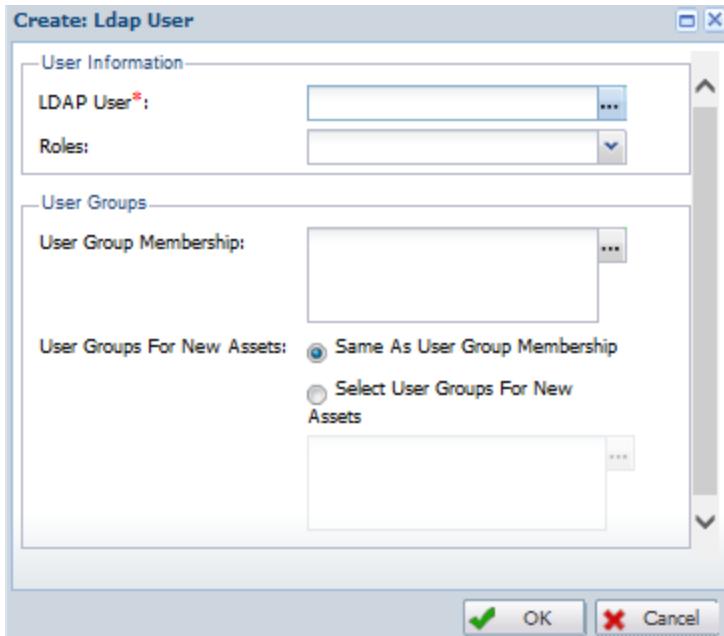
To add LDAP Users, perform the following steps:

1. Go to **Security > LDAP Server > Permissions**.

User / Group	Role
Engineering-Test	Administrator
Dan Horowitz	Administrator

2. Click **Add User**.

3. Complete the **Create: Ldap User** configuration fields.

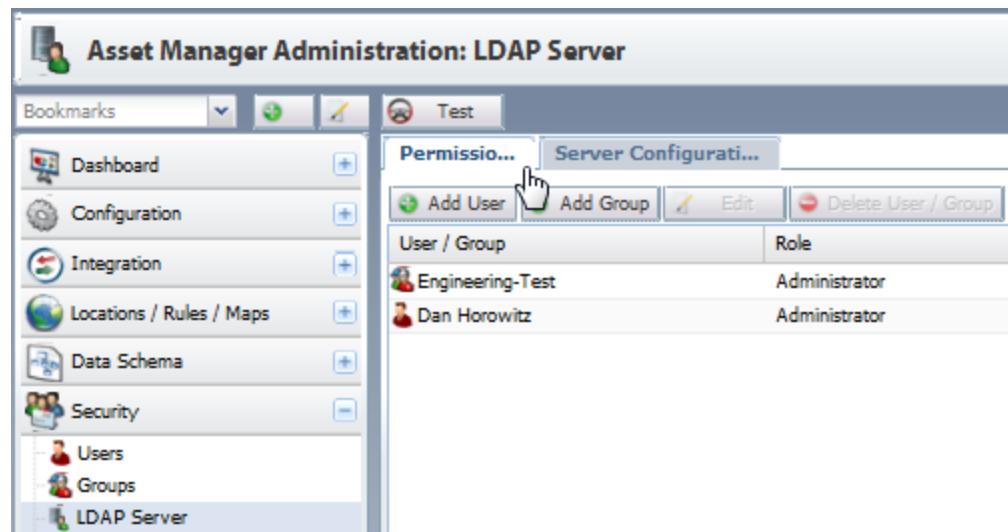


- **LDAP User:** Choose the name of the LDAP User.
- **Roles:** Assign a Role to the User.
- **User Group Membership:** Assign one or more Groups to the User.
- **User Groups For New Assets:** Choose either to use the same Group as the User Group or choose one or more different Groups.

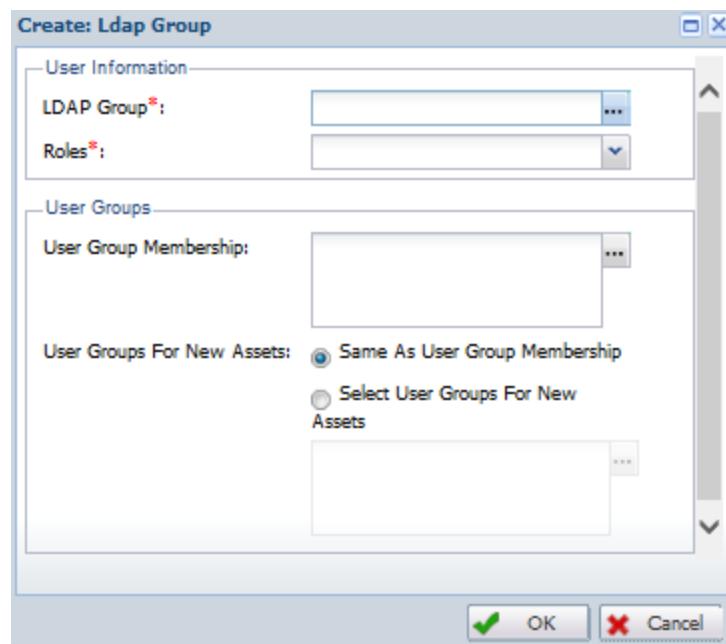
4. Click **OK**.

To add LDAP Groups, perform the following steps:

1. Go to **Security > LDAP Server > Permissions**.



2. Click **Add Group**.
3. Complete the **Create: Ldap Group** configuration fields.



- **LDAP Group**: Choose the name of the LDAP User.
- **Roles**: Assign a Role to the User.
- **User Group Membership**: Assign a Group to the User.

- **User Groups For New Assets:** Choose either to use the same Group as the User Group or choose one or more different Groups.

4. Click **OK**.

NOTE: When a User logs in for the first time based on group LDAP membership, a new user will be created on the user list. This user will have limited configuration options and is used to store preferences such as unit of measurement. The account can be deleted from the system, but will be recreated the next time a user logs in if LDAP group membership continues to allow access.

Statistical Computation Engine

Licensing

A Statistical Pack is a grouping of statistical data from a selected data range that is computed on a scheduled basis. The statistical computations supported are Maximum, Minimum, Median, Average, and Standard Deviation. Outputs from this computation are handled as Asset Attributes, and can be utilized throughout Asset Manager; for example, added to graphs, reports, dashboards, and map views.

Statistical Packs define source attributes, statistics to be computed, computation frequency, historical data window, and the target attribute that will store the computed statistic. Statistical Policies define the target asset types with which Statistical Packs can be associated or applied.

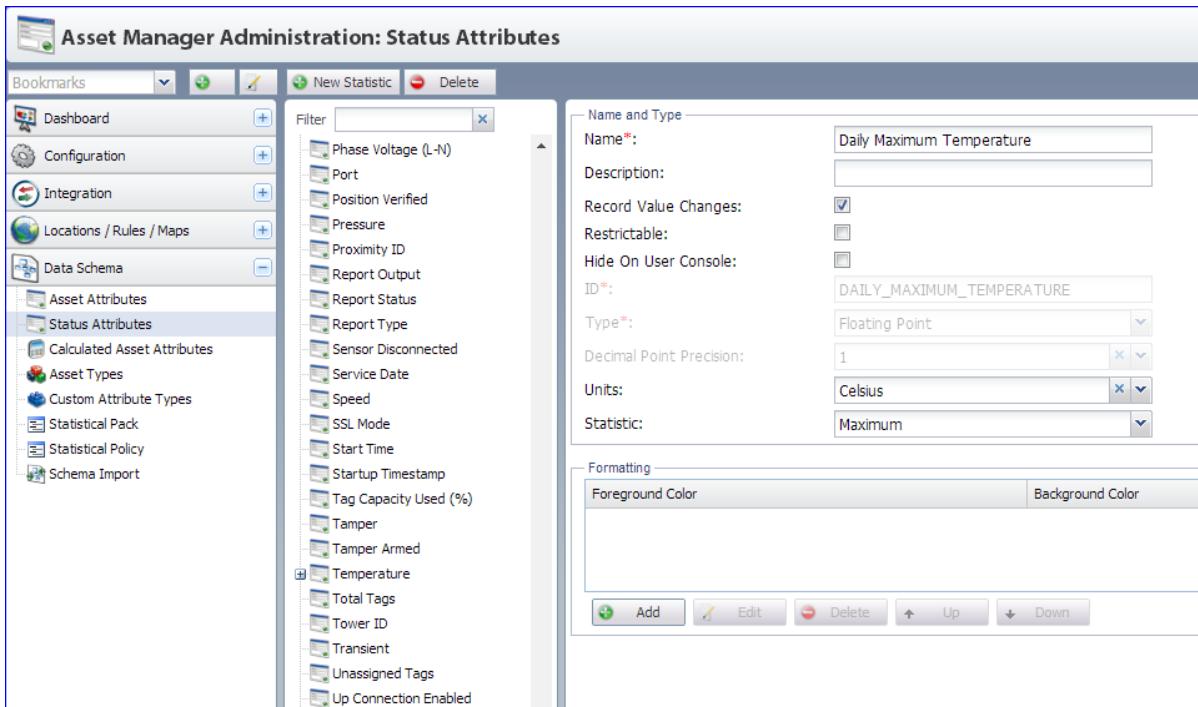
Once the Statistical Computation Engine is enabled, two additional menu entries will be available for use in the Administrator console under the Data Schema task: Statistical Pack and Statistical Policy.

xxx-yyy	DRAFT 256	7/2/2015
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NOTE: Statistical attributes must be created before Statistical Packs and Statistical Policies can be configured. Create new statistical attributes from Asset Attributes or System Attributes. The new statistical attribute is created as a child attributes of the source attribute.

As an example, go to **Administrator Console > Data Schema > Status Attributes**:

- Select an **Attribute**, such as Temperature
- Click on the **New Statistic** button
- Enter a Name, in this case “Daily Maximum Temperature”
- Choose **Maximum** from the Statistic drop-down menu
- Click **Save Changes**



Similarly, create other statistical attributes for Daily Minimum Temperature, Daily Average Temperature, Daily Median Temperature, and Daily Standard Deviation. These new attributes must then be associated with an asset type. Navigate to **Administrator console > Asset Types** and choose the appropriate Asset Type. In this example, you would choose Asset > Sensor > Temperature-Humidity. Then you would click on the **Add** button to add the newly created attributes.

Create a Statistical Pack

1. Navigate to **Administrator console > Data Schema > Statistical Pack** and click **New**.
2. Complete all required and any desired additional fields.
 - **Name:** Assign a name to the Statistical Pack.
 - **Description:** If desired, input a detailed comment describing purpose or meaning of the Statistical Pack.
 - **Source Attribute:** Select the Parent attribute under which you created the Statistical Attributes to be bundled into a pack.
 - **Statistics:** Select the Statistical Attributes to bundle.
 - **Data Window:** For the Data Window, select 1 day (that is, daily). Note that the Data Window should generally match the Update Frequency.
 - **Update Frequency:** Select Daily, Weekly, or Monthly. The Statistical Computation will be performed at midnight local time, Sunday for a weekly update, first day of the month for monthly.
3. **Save Changes.**

A Statistical Policy must be created to associate a statistical pack with assets.

Create a Statistical Policy

1. Navigate to **Administrator console > Data Schema > Statistical Policy** and click **New**.
2. Complete all required and any desired additional fields.
 - **Name:** Assign a name to the Statistical Policy.
 - **Description:** If desired, input a detailed comment describing purpose or meaning of the Statistical Policy.

xxx-yyy	DRAFT 258	7/2/2015
---------	--------------	----------

- **Filter Asset Type:** Select an asset type to filter by.
- **Location** Select a location to filter by.
- **Attribute:** Select an attribute to filter by.
- **Value Operator:** Select to filter by value equals, does not equal, in, attribute has value, or attribute has no value (is empty).
- **Value:** Select to filter by a specific value, either equals or does not equal.
- **Statistical Packs:** Click the Ellipsis ... button to access the pack selection window. Move packs from available to selected as desired. Click **OK** when finished.

3. Save Changes.

Adaptive Alert Thresholds

Adaptive Alert Thresholds are a powerful feature enabled by license key. Adaptive thresholds enable mathematical comparatives using values and variables as part of the evaluation logic for thresholds. Adaptive thresholds are user-configurable allowing simple and complex logic to be expressed. For example, Adaptive Thresholds can compare an attribute to another attribute or compare an attribute to a mathematical formula involving additional attributes (variable) and constants (values). Furthermore, Adaptive Thresholds can leverage any type of attribute in the system including calculated attributes and statistical attributes. Some examples include:

- An attribute compared to a constant, such as “Daily Average Temperature > 80 degrees F.” This example threshold allows you to receive a warning of temperature trends before they become an issue.
- An attribute compared to the addition of another attribute and a constant such as “Temperature > Monthly Average Temperature + 15 degrees F.” The monthly average temperature of a facility may change depending on seasonal factors and still be within acceptable operating limits. This threshold allows you to look for outliers of longer-term trends.

xxx-yyy	DRAFT 259	7/2/2015
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- An attribute compared to the addition of two other attributes such as “Temperature > Weekly Average Temperature + Weekly Standard Deviation.

Adaptive Thresholds are set in the **User Console >Alerts >Thresholds** task. As an example, we will set a threshold that monitors for temperatures that are outside of the weekly average temperature.

- Click on the **New** button
- Select **Adaptive Alert Threshold**
- Enter a Name. In this example, it will be called “Weekly Temp – outliers in Austin”
- Filter by Asset Type. In this example, we selected Temperature-Humidity
- Optionally, other attributes can be selected to filter the results. In this example, we chose to filter by location (Austin Data Center)
- In the Adaptive Attribute section, we choose Temperature for the Adaptive Attribute.
- For the operator, we choose “>”
- For the Adaptive Attribute Expression, we choose “Weekly Temperature Average + 10 + Weekly Temperature Standard Deviation”
- Click **Save Changes**

Asset Manager: Thresholds

Bookmarks: Dashboard, Tag Management, Customization, Assets, Access Control, Maps, Reports / Graphs, Events, Alert Management, Alert Viewer, Actions, Thresholds.

Filter: Adaptive, Custom Thresholds, Doors and Assets, Other, Rack T and H, RCI and RTI, Temp > 100, Temperature < 100 (Disabled).

Asset Alert Threshold: Adaptive Alert Threshold

Basic Information

- Name*: Weekly Temp - outliers in Austin
- Threshold Schedule: Always Active
- Enabled:
- Alert Severity*: Warning
- User Required To Acknowledge Alert:
- Type Of Alert To Create*: Custom Alert

Security

- Execution User Account: admin

Alert Filter

- Threshold Filter Asset Type*: Temperature - Humidity
- Threshold Filter Location: Austin Data Center
- Threshold Filter Asset State: Active
- First Attribute:
- First Attribute Value Operator:
- First Attribute Value:
- Second Attribute:
- Second Attribute Value Operator:
- Second Attribute Value:
- Threshold Delay: 0 seconds

Adaptive Attribute

- Adaptive Attribute*: Temperature
- Adaptive Attribute Value Operator*: >
- Adaptive Attribute Expression*: $0 + \text{Weekly Temper} * (10 * \text{Weekly Tempe})$

Alert Actions

- Alert Actions: Email Chris

Alert Messages

A custom alert condition has been detected for the asset /s/AlertEntity

Buttons

- Save Changes

For more information about Adaptive Alert Thresholds, refer to this article on the RF Code support site: support.rfcode.com/customer/portal/articles/1656565

Integrating with RF Code IR Locators

When you deploy an RF Code IR locator, you need to configure it both through its configuration utility and also in Asset Manager. RF Code Rack Locators and Room Locators are both IR locators and they each have their own configuration utility.

When installed, IR locators send location beacons, which are detected by IR-enabled tags. These tags include the received IR beacons in their transmissions to the readers.

To configure an IR Locator, perform the following steps:

1. Ensure that at least one RF Code reader has been configured.

NOTE: For more information, refer to the reader configuration sections:

[RF Code Reader Configuration with the Reader Web Interface](#)
[Adding and Configuring Readers in the Admin Console](#)

2. Add the right IR Tag Groups for your particular IR tags to Asset Manager.

NOTE: For more information on adding Tag Groups, refer to the [Adding Tag Groups](#) section.

3. Configure the IR Locator with its specific locator configuration utility.

NOTE: For more information, refer to the user guide for that locator:

<http://support.rfcode.com/customer/portal/articles/722910>

4. Associate an IR Rule to a Location in Asset Manager.

NOTE: For more information, refer to the [Locations and Rules](#) section.

Integrating with PDUs and CDUs

Asset Manager can be used to monitor power capacities and usage in data centers with the RF Code line of R170 sensor tags. RF Code supports product families of third-party power devices from STI, Geist, Emerson, and Schneider Electric/APC rather than individual product models. As of May 2014, RF Code sells four different R170 sensor tags for various power distribution units (PDUs) and cabinet power distribution units (CDUs) manufactured by the following partner companies:

- **ServerTech (STI)** : Smart and Switched CDUs with PIPS (Per Inlet Power Sensing) and with or without POPs (Per Outlet Power Sensing).
- **Geist** : The satellite current monitoring family of PDUs.

xxx-yyy	DRAFT 262	7/2/2015
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- **Emerson** : Liebert MPX PDUs shipped with an RPC-1000 module and Liebert MPH PDUs shipped with an embedded RPC-1000.
- **Schneider Electric/APC** : APC 8xxx series PDUs running firmware version 6.0.9 or higher.

Using RF Code Sensor Tags with PDUs and CDUs

The exact process of physically deploying and configuring PDUs and CDUs for use with Asset Manager depends on the make of the power device(s) you are using, but essentially the process is the following:

1. Physically connect the RF Code R170 sensor tag.
2. Add the Tag Group and Sensor Tag Asset to Asset Manager.
3. Modify a custom view so you can view power attributes for the PDU or CDU.

Installing PDU/CDU Sensor Tags

For instructions on the physical installation of RF Code R170 sensor tags for use with PDUs and CDUs, refer to the Integration Guide and Tech Spec documents specific to your PDU or CDU.

These guides are available on the RF Code Support website at:

support.rfcode.com/customer/portal/articles/722910

Adding PDU/CDU Sensor Tag Assets

To add an R170 Sensor Tag and its associated PDU/CDU asset, perform the following steps:

1. In the **Admin Console**, navigate to **Configuration > Tag Groups** and add the Tag Group.

NOTE: Below are the Treatment Codes and Tag Groups for specific R170 Sensor Tags:

PDU Manufacturer	Treatment Code	Group Code
	Treatment Code	Group Code
ServerTech (STI)	04M	STIRCK

PDU Manufacturer	Treatment Code	Group Code
Geist	04N	GSTRCK
Emerson	04O	EMRRCK
APC	04Q	APCRCK

2. On the **User Console**, navigate to **Manage Assets** and create new PDU sensor assets using a **PDU Asset Type**.

3. Complete the PDU configuration fields and save the new asset.

The new asset will appear in your list of assets:

Location	Status	Attribute	Operator	Value	Go
Name	Asset Tag	Online Status	Message Loss Rate	PDU Disconnected	PDU Model
Raritan 504	RTNRCK00055504	Yes		No	
Emerson 805	EMRRCK00055805	Yes		No	LIEBERT MPX
Geist 606	GSTRCK00059606	Yes		No	

4. To view further details for any specific parent PDU device, double-click the row for it from the Asset list.

NOTE: The PDU Attributes and values are found within various tabs.

EMP PDU 1	
PDU	Other Attributes
PDU Feed Line	PDU Outlet
PDU Breaker	PDU Phase
PDU Input Channel	
Basic Information	
Name:	EMP PDU 1
Asset Tag:	EMRRCK00055805
Description:	
Asset Location:	
Location Mode:	Locked
Locked Location:	
Expected Location(s):	

NOTE: Data collection from PDUs happens in 10-minute intervals. On data reported on a 10-minute period, the PDU will take a “snapshot” of the data for the most recent 10-minute period and depending on the PDU implementation and the specific data being requested and sent, this may represent the data as of the end of the period, or it may reflect the average of the data accumulated during the given period. In the latter case (which applies to most data collected about power usage), where the data reflects the average of the 10-minute period, this can cause a delay in the data being presented or reported of up to 10 minutes, that is, it may take 10 minutes to see any change in the power usage being display (for example, a stair-step jump on power draw) and up to 20 minutes before the change actually represents the full “snapshot” period. Again, this can happen because it takes up to 10 minutes for the PDU to transmit the data that was collected in the preceding 10-minute interval and Zone Manager waits until it has received all the data before any of it is presented. Essentially, averaging helps to prevent artificial errors and inconsistencies that would occur as the result of time aliasing and the brief delay in displaying data helps to ensure that it is as accurate as possible.

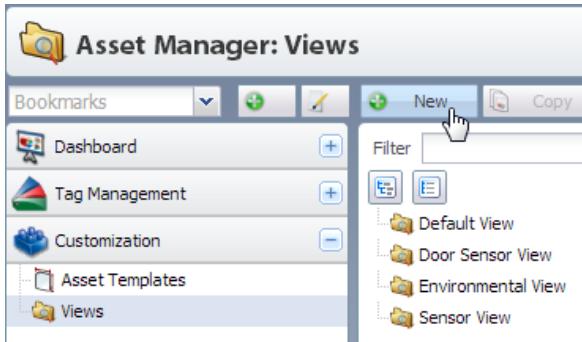
Creating a Custom PDU View

Because the Default View does not contain columns to display values for standard PDU power Attributes, you will want to create a new view to show these at quick glance.

NOTE: For more about Views, refer to the View section in this guide.

To create a custom PDU View, perform the following steps:

1. Go to **Customization > Views** and click the **New** button to create a new view to show specific power attributes.



2. Configure the **View** to show the **Attributes** you want to see and choose which **User Groups** will have access to it.

Basic Information

Name*:	PDU Details
Description:	<input type="text"/>
Asset Types:	<input type="button" value="..."/>

Available

Activation Count #1
Activation Count #2
Activation Input #1
Activation Input #2
Active Alert Count
Agent IP Address
Airflow Position
Alert Acknowledge Note
Alert Acknowledged
Alert Acknowledged By
Alert Message
Alert Repeat Message
Alert Resolve Message

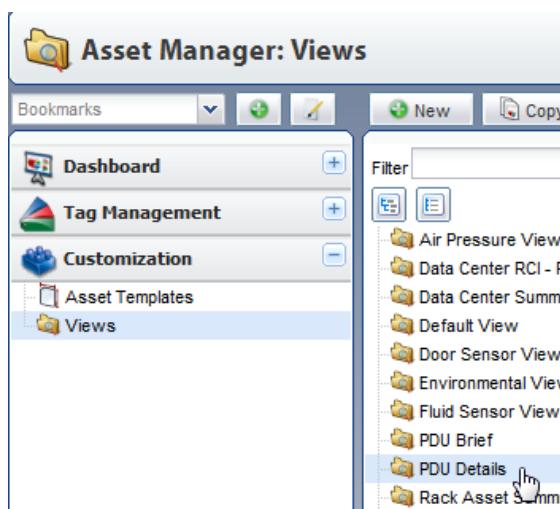
Selected

Name
Asset Type
Asset Location
PDU Active Power
PDU Apparent Power
PDU Disconnected
PDU Disconnected Towers
PDU Model
PDU Power Factor
PDU Serial Number
PDU Total Active Power Used
PDU Total Apparent Power Used
PDU Total Power Start Time

Groups

Allowed User Groups:	Everyone	<input type="button" value="..."/>
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The new view appear in the list of Views.



3. To see the PDUs and the values for their power-related Attributes, go to **Assets > Manage Assets** and choose the new view from the View drop-down menu.

Type	Location	Status	Attribute	Operator	Value
Asset	Austin Data Cen	Active			
Air Pressu...	Differen...	Austin Data Center			
Air Pressu...	Differen...	Austin Data Center			
Air Pressu...	Differen...	Austin Data Center			
Air Pressu...	Differen...	Austin Data Center			

NOTE: Depending on the number of Assets in your system, you may have too many Assets listed to see any PDUs on the screen and the PDU Attributes in the PDU View may not be relevant. To shorten the list, restrict the list with the Type filter to show only PDUs.

Asset Tag	Outlet	Outlet Active Power	Outlet Amperage	Outlet Apparent Pow	Outlet Configuration	Outlet Label	Outlet Power Factor	Outlet Switched On	Outlet Total Active	Outlet Total
STIRCK00059209										
STIRCK000000017										
STIRCK00059204										
STIRCK0000000507										
STIRCK00000390										
STIRCK00059217										
STIRCK000003760										
STIRCK000000015										

Profile: sothemu | Low battery has been detected for the tag associated with asset RFC IT Closet - Unattached Rack Doors Sensor 10.

After being restricted by the View and the Filter, the Manage Assets list will then show only PDU assets. Use the View drop-down if desired to change views of these assets.

Asset Manager: Manage Assets

Search | RF CODE

New Edit View Retire Unretire Delete Export Pause Updates PDU View In Motion Jim 0-5v TEST VIEW Jim Demo Location / Online Location Change View Location vs. Previous Location LOW BAT View Motion View PDU Outlet View PDU View Rack Airflow Position Temperatures RCI Sensor View Server View

Type	Location	Status	Attribute	Operator	Value	
PDU	All	Active				
Asset Location	Asset Type	Asset Tag	Name	PDU Active Power	PDU Apparent Pow.	PDU Count
RFC Rack 3	PDU	STIRCK00059209	Rack 3 - PDU 1A	0 W	0.0 VA	
RFC Rack 1	PDU	STIRCK00059204	ServerTech PDU Tag 1234			
W. Gauer House	PDU	STIRCK00005027	Rack 1 - PDU 1A			
India	PDU	STIRCK00001390	TIMGroupSTIRCK1	0 W	0.0 VA	
RFC Rack 4	PDU	STIRCK00059217	Rack 4 - PDU 1A			
India	PDU	STIRCK00003760	TIMGroupSTIRCK2			
RFC Rack 2	PDU	STIRCK00000015	Rack 2 - PDU 1A			

Integrating with ServerTech's Sentry Power Manager (SPM)

Asset Manager is tightly integrated with ServerTech's SPM to enable PDU/CDU power and sensor data from SPM to flow to Asset Manager. SPM integration functionality is enabled by entering a valid license key into Asset Manager and does not require any additional software to be installed. License keys can be purchased from your RF Code representative.

Sentry Power Manager and Asset Manager are installed separately and then configured. After a license key has been added in Asset Manager, ensure each of the following steps is completed.

1. Install and configure Sentry Power Manager. PDUs must be added to SPM using the standard SPM capabilities. For support on configuring SPM and adding PDUs, please contact Server Technology at www.servertech.com.
2. Add the Sentry Power Manager to Asset Manager as a data source.
3. Add the SPM Server as a Reader in Asset Manager.
 1. Navigate to **Admin Console > Configuration > Readers** and click **New**.
 2. Complete all required and any desired additional fields.
 - **Name:** Enter a Name for the SPM server
 - **Zone Manager:** choose “Local Zone Manager”

- **Enabled:** check this box to allow Asset Manager to begin communicating with the SPM server
- **Hostname:** enter the hostname or IP address of the SPM server
- **Port:** select port “80”
- **Authentication:** enter the User ID and Password for the SPM server
- **Data Refresh Rates:** select the CDU Refresh Period and CDU List Refresh Period

Asset Manager Administration: Readers

Basic Information

- Name*: SPM thing
- Zone Manager*: Local Zone Manager
- Description:
- Enabled:

Network Settings

- Hostname: 66.214.208.101
- Port: 80

Authentication

- User ID: rfcode
- Password: *****
- Confirm Password: *****

Data Refresh Rates

- CDU Refresh Period*: 60 seconds
- CDU List Refresh Period*: 600 seconds

Status

- Reader State:

8. Save Changes.

9. Add the SPMCDU tag group to the Asset Manager configuration Tag Group configuration.

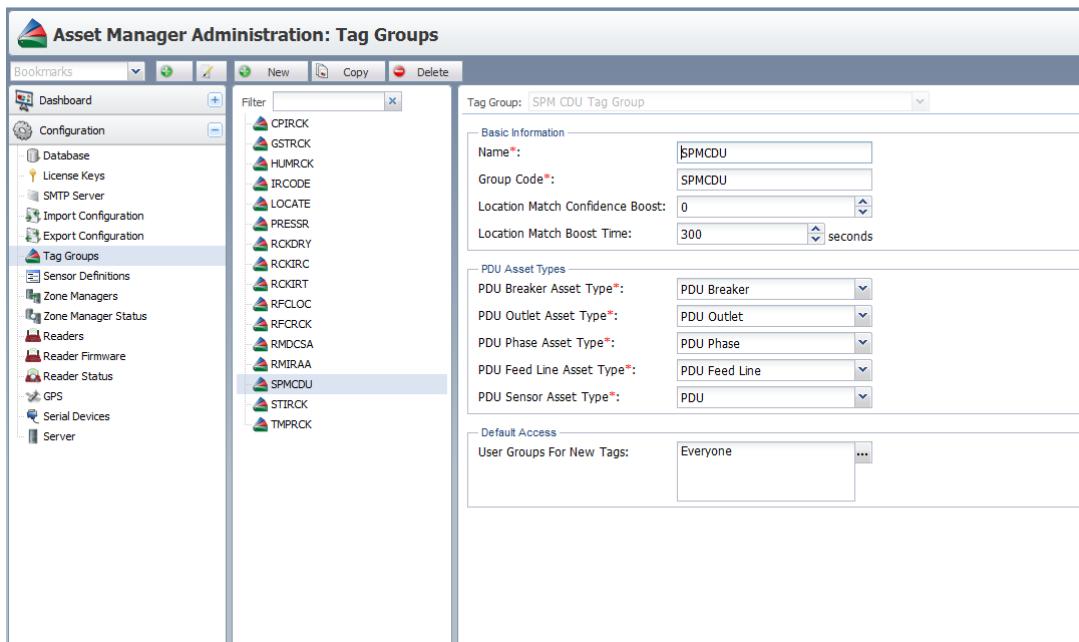
1. Navigate to **Admin Console > Configuration > Tag Groups** and click **New**.

2. Select the **SPMCDU** tag group from the drop-down.

3. In the PDU Sensor Asset Type field, select **Sensor > RPDU** from the dropdown.

4. **Save Changes.**

Once these steps are completed, Asset Manager connects with the SPM system and creates unassigned tags for each PDU. The tag ID for the PDUs from SPM utilize a naming convention of “SPMCDU” concatenated with the eight-digit object ID from Sentry Power Manager (for example, “SPMCDU00000001”). If a PDU has an external temperature or humidity sensor, additional unassigned tag objects will be created for those sensors as well. The tag ID for the PDU sensors from SPM utilize a naming convention of PDU tag ID concatenated with “ - sensorA1” or “ - sensorA2” (for example, “SPMCDU00000001 – sensorA1”). If the PDU to which an external sensor is attached is daisy-chained to a parent PDU, then the naming convention will be PDU tag ID concatenated with “- sensorB1” or “- sensorB2” to indicate the secondary PDU unit. These unassigned tags can be associated to assets.



Integrating with JMX, BACnet, Modbus, and NetBotz

The Integration task allows administrators to configure Asset Manager for use with Java Management Extensions (JMX), BACnet and Modbus standards. A separate license key must be

purchased from RF Code to access these features. There are eight sub-tasks available in this task, but the sub-task options only appear if license keys for them have been purchased and properly installed.

The screenshot shows the 'Asset Manager Administration: JMX Monitor' window. On the left is a navigation sidebar with icons for Dashboard, Configuration, Integration (which is selected), and JMX Monitor. Under Integration, there are links for JMX Domains, BACnet Slave Server, BACnet Slave Devices, BACnet Slave Object IDs, Modbus Slave Server, Modbus Slave Devices, and Modbus Slave Addresses. The main panel has two sections: 'Basic Information' and 'Network Settings'. In 'Basic Information', there is a checkbox labeled 'Enabled*'. In 'Network Settings', the 'Hostname*' field is set to 'localhost' and the 'Port*' field is set to '8686'.

Integrating with JMX

JMX is part of the Oracle Java SE Platform and provides a simple, standard way of managing resources such as applications, devices, and services. The JMX specification defines the architecture, design patterns, APIs, and services in the Java programming language for management and monitoring of applications and networks. For more on JMX, refer to: <http://www.oracle.com/technetwork/java/javase/tech/javamanagement-140525.html>

JMX Monitor

This sub-task lets you publish Asset Manager data using Java Management Extensions (JMX). To use this feature, you will need a separate license to enable the functionality. Once the license key has been installed, JMX publishing is done through the configuration of the sub-tasks JMX Monitor and JMX Domains.

When configuring the JMX Monitor you will need to specify the hostname and port of the computer where the JMX software is installed. Asset Manager defaults to the local host. The local host should be used if the software is installed and running on the same computer as Asset Manager.

To configure Asset Manager to use JMX, perform the following steps:

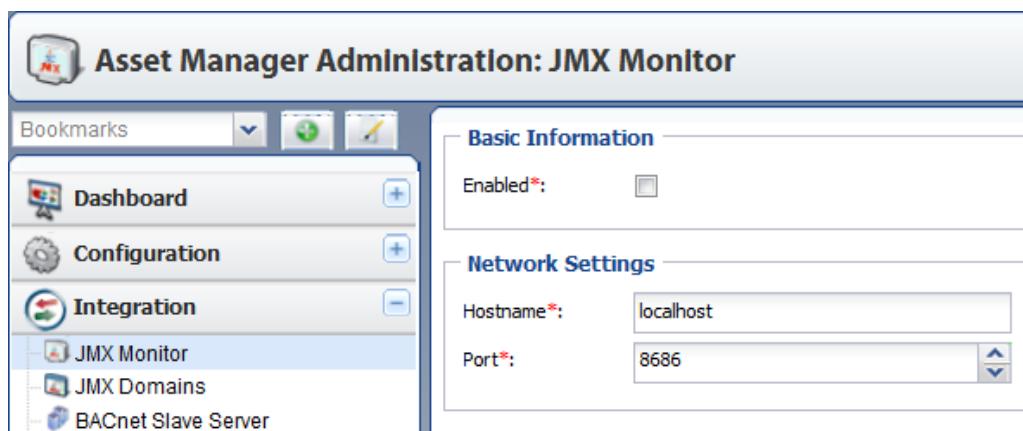
1. Install the JMX License Key using the same steps as outlined in the **License Key Configuration** sub-task.

The JMX License Key is a separate key that must be installed in addition to the Asset Manager license key. Once the key has been properly installed, it will appear in the license key list.

2. After you install the JMX key, restart the RF Code Asset Manager service via the Microsoft Windows Service Manager or reboot the Asset Manager application server.

NOTE: If you are running Asset Manager in a Linux environment and need more information about how to restart the service, refer to Linux Installation section of this document.

3. Next, go to **Integration > JMX Monitor**.



4. Check the **Enabled** checkbox.
5. Enter the **Hostname** of the server running the JMX software.
6. Enter the **Port** (TCP/IP) that Asset Manager will use to communicate with the JMX software.
7. Click **Save Changes**.

JMX Domains

A JMX Domain is an organization of information (objects and attributes) which will be published via JMX. Asset Manager automatically loads a default schema as part of its installation routine.

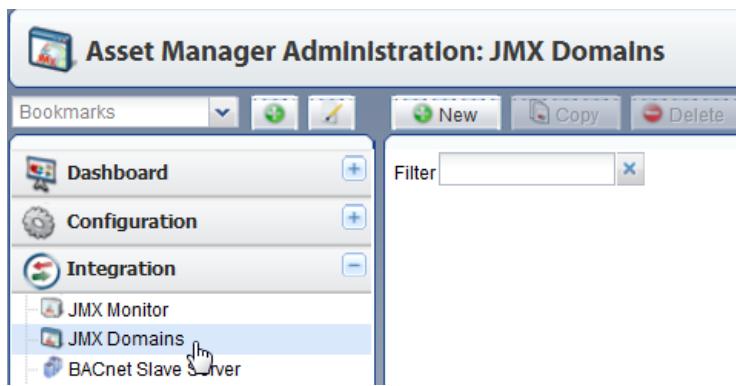
Typically no changes are needed to be made to the JMX Domains if you are using the default Asset Manager Schema. The JMX Domains included with Asset Manager are as follows:

- Door Sensors (door position information)
- Dry Contact Sensors (dry contact position information)
- Environmental Sensors (temperature & humidity information)
- Fluid Sensors (fluid detection information)
- Readers (status information about RF Code network based readers)
- Zone Managers (status information about RF Code Zone Manager systems)
- Summary Assets (summarized sensor information for groups of sensors)

If you import and use the default asset schema, then Asset Manager will be fully configured after the schema import and you can begin publishing information from Asset Manager to an external software agent. If you will be using a different Schema than the default, then you need to set up a custom JMX Domain.

To set up a custom JMX Domain, perform the following steps:

1. Go to **Integration > JMX Domains**.



2. Click the **New** button.
3. Complete the JMX Domain configuration settings.

xxx-yyy	DRAFT 274	7/2/2015
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NOTE: The configuration options are explained below.

NOTE: Those fields with asterisks (*) are required fields.

4. Click the **Save Changes** button.

The custom JMX Domain that appears in the list to the left.

JMX Domain Configuration Settings

The following configuration settings are available when configuring JMX Domains.

The screenshot shows a configuration interface for JMX Domains. It consists of three main sections:

- Basic Information:** Contains a single required field "Name*".
- JMX Domain Filter:** Contains eight filter fields: "Filter Asset Type*", "Filter Location", "First Attribute", "First Attribute Value Operator", "First Attribute Value", "Second Attribute", "Second Attribute Value Operator", and "Second Attribute Value".
- JMX Domain Attributes:** Contains a single required field "Attributes".

Basic Information

- **Name:** Create a name for the JMX Domain.

JMX Domain Filter

- **Filter Asset Type:** The JMX Domain filter is used to specify a set of assets. The assets which match this filter are used to publish attribute values via JMX. Choose the asset type

xxx-yyy	DRAFT 275	7/2/2015
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that you would like to use for the JMX Domain.

- **Filter Location:** Choose a location.
- **First Attribute:** Choose an attribute that you would like to filter by.
- **First Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **First Attribute Value:** Input the value that the first attribute should have for the filter.
- **Second Attribute :** Choose a second attribute you would like to filter by.
- **Second Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Second Attribute Value:** Input the value that the second attribute should have for the filter.

JMX Domain Attributes

- **Attributes:** Select the attributes from your schema that you would like to publish using JMX.

Integrating with BACnet

To integrate with BACnet, configure the BACnet Slave Server, BACnet Slave Devices, and BAC Slave Object IDs sub-tasks.

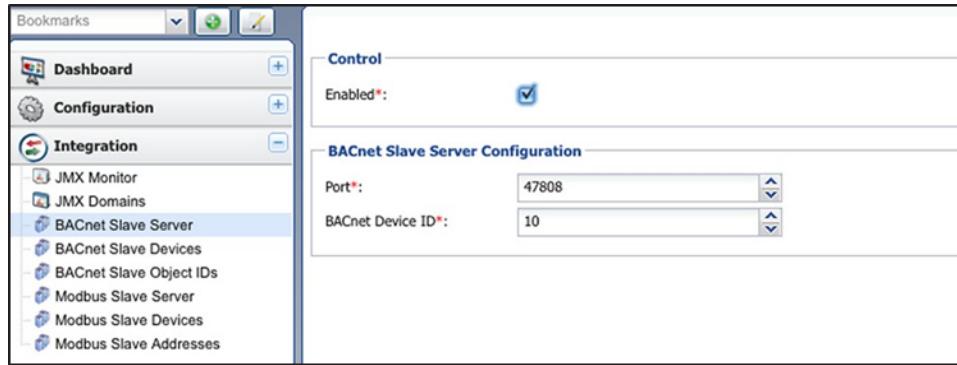
BACnet Slave Server

The BACnet Slave Server configuration panel is used to specify the network settings to allow BACnet clients to query attribute values published via the BACnet IP protocol. To configure Asset Manager to publish attribute values via BACnet, you will need to install a BACnet license key on the License Key configuration panel using the **Configuration > License Key** sub-task. Once a BACnet license key is installed, the server should be restarted. After the server has restarted, you will be able to configure BACnet settings.

The BACnet Slave Server panel is used to configure the parameters BACnet clients will use to connect to Asset Manager's BACnet server.

1. Navigate to **Integration > BACnet Slave Server**.

xxx-yyy	DRAFT 276	7/2/2015
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2. Select the **Enabled** checkbox.
3. Assign a Port.

NOTE: The Port attribute allows the administrator to configure the UDP port on which the Asset Manager BACnet server is listening for BACnet client requests. The default value is 47808 which is the default UDP port for BACnet UDP. Enter the Port number of the BACnet slave server.

4. Assign a BACnet Device ID.

NOTE: The BACnet Device ID allows the administrator to configure the unique ID used by the BACnet protocol to identify a device. The device ID should not duplicate any other BACnet device ID used in a BACnet network. The BACnet Device ID should be in the range of 0 to 4194303. Enter the BACnet Device ID. This can be set to any arbitrarily chosen number.

5. Click the **Save Changes** button.

BACnet Slave Device

The BACnet Slave Device is used to configure a set of assets and attributes whose values will be published by the Asset Manager BACnet server. BACnet clients can then query the current values of the attributes published for each of the BACnet Slave Devices.

1. Navigate to **Integration > BACnet Slave Devices**.
2. Click the **New** button.

3. Complete all required and any desired additional fields.

Basic Information

Name*:	BACnet 1
Description:	

BACnet Device Sensor Attributes

Attributes*:	Dew Point Temperature Humidity
--------------	--------------------------------------

Asset Filter For Publishing BACnet Device Sensor Attributes

Filter Asset Type*:	Humidity & Temperature
Filter Location:	
First Attribute:	
First Attribute Value Operator:	
First Attribute Value:	
Second Attribute:	
Second Attribute Value Operator:	
Second Attribute Value:	

Basic Information

- **Name:** Create a name for the Slave Device.
- **Description:** Create a description for the Slave Device.

BACnet Slave Device Sensor Attributes

- **Attributes:** The Attributes parameter allows the administrator to determine which attributes to publish via BACnet. Currently, Asset Manager allows numeric (Float, Integer, and Enum) and Boolean attributes to be selected. The BACnet object type for numeric attributes is analog input. The BACnet object type for Boolean attributes is binary input. Select the attributes from your schema that you would like to publish using BACnet.

Asset Filter for Publishing BACnet Device Sensor Attributes

- **Filter Asset Type:** The Asset Filter is used to define the criteria for selecting which assets and their corresponding attributes will be published by the BACnet server and therefore made

xxx-yyy	DRAFT 278	7/2/2015
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available to BACnet clients. Select the asset type when you wish to limit the filter to.

- **Filter Location:** Select a location that you would like to filter by.
- **First Attribute:** Choose an attribute that you would like to filter by.
- **First Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **First Attribute Value:** Input the value that the first attribute should have for the filter.
- **Second Attribute:** Choose a second attribute you would like to filter by.
- **Second Attribute Value Operator:** Choose the operator for the attribute you have selected.
- **Second Attribute Value:** Input the value that the second attribute should have for the filter.

4. Save Changes.

BACnet Slave Object IDs

For each attribute value to be published by the BACnet Slave Devices, Asset Manager will automatically assign a unique BACnet object ID used by BACnet clients to query an attribute's current value. The BACnet Slave Object IDs panel allows you to view the value of the BACnet object IDs Asset Manager has assigned to each attribute published via BACnet.

1. Navigate to **Admin Console > Integration > BACnet Slave Object IDs**.

A list of the currently defined BACnet Slave Devices appears in the right-hand pane.

2. Select a slave device to view the BACnet object IDs Asset Manager has assigned to each attribute value.

There may be several Object IDs depending on the type and number of attributes that you specified.

Name	Asset Tag	Asset Type	Dew Point Object ID	Temperature Object ID	Humidity Object ID
Asset 3 Test	HUMRCK0000018I	Humidity & Temper 6	7	8	
Asset 2 Test	HUMRCK0000016I	Humidity & Temper 0	1	2	
Asset 1 Test	HUMRCK0000001!	Humidity & Temper 3	4	5	

3. The entire BACnet Object ID attribute mapping for a BACnet Slave Device can be exported in XML, CSV, or PDF format to allow a BACnet administrator to conveniently configure

BACnet client software. To export these Object IDs use the **Export XML**, **Export CSV** or **Export PDF** buttons.

4. Access your BACnet system to configure your BACnet client software and complete the integration.

NOTE: For information regarding how to integrate your BACnet system please refer to your BACnet client manuals or refer to the BACnet website <http://www.bacnet.org>.

NOTE: RF Code is a registered BACnet vendor and RF Code's vendor ID is 406.

Integrating with Modbus

Exposing data from Asset Manager via Modbus TCP is done by following the steps below. In general, Modbus configuration consists of licensing, enabling, configuring, and mapping Modbus features to those in Asset Manager.

NOTE: If you have not already done so, contact your RF Code sales representative in order to obtain the license that enables the Modbus integration module.

To license Modbus within Asset Manager, perform the following steps:

1. In the **Admin Console** go to **Configuration > License Keys**.

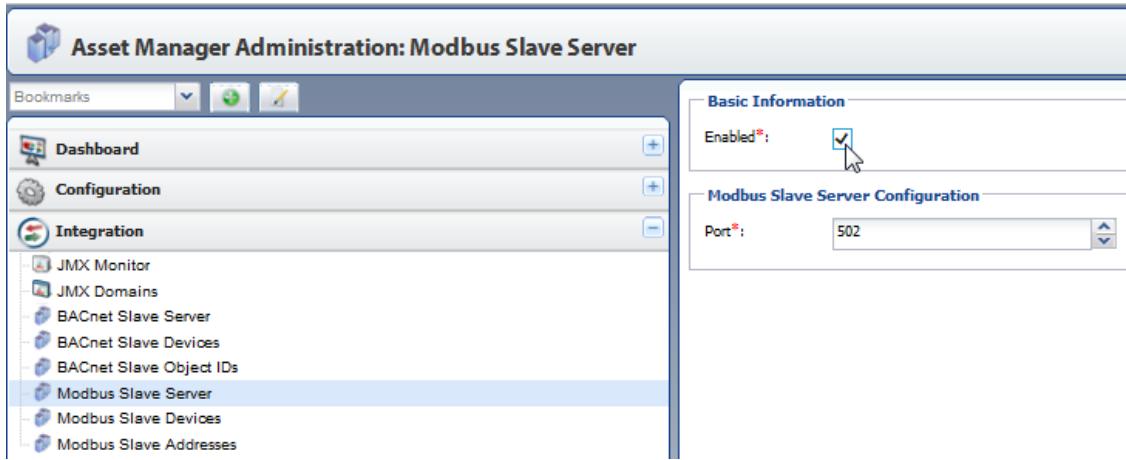
Asset Manager Administration: License Keys			
Add License Key Delete License Key			
License Key	License Count	Expiration Date	License Key Type
KUHU-BEUS-YHOL-JEPF	1	Never	BIRT
JHEV-EAAS-ERUQ-UHHS	25000	2013-11-05	ASSET
BBER-PKSM-CMEL-KAMU	1	Never	BACNET
PFTL-BBTL-JULAH-TTSW	1	Never	MODBUS
THB-BBR-KOBEL-MLE	1	Never	JMX

2. Enter the license key.

Modbus Slave Server

To enable Modbus integration and to set the Port, perform the following steps:

1. Navigate to **Admin Console > Integration > Modbus Slave Server** and select the **Enabled** check box.



2. Under **Modbus Slave Server Configuration**, set the **Port**.

NOTE: By default, the port is set to **502**. However, this is a common port used for networking industrial electronic devices. If you complete the configuration of Asset Manager for Modbus and there is still no communication between the RF Code and BMS systems (for example, the Port reports that it is not responding), change this port setting (to some port higher than 1024, such as 9502) and test communication between the systems again.

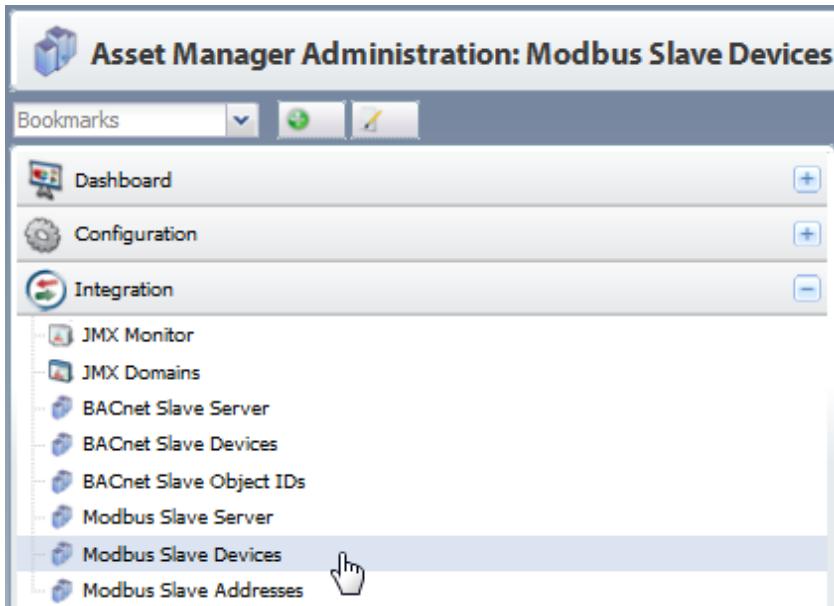
NOTE: Ensure the port used is open in your firewall, whether you use port 502 or another port, to allow the BMS/Modbus Server access to the data.

3. **Save Changes.**

Modbus Slave Devices

To configure the Modbus Slave Devices, perform the following steps:

1. Navigate to **Admin Console > Integration > Modbus Slave Devices**.



2. Choose the sensors/locations/details to monitor.
3. Complete all required and any desired additional fields.

Modbus Device Sensor Attributes

- **Attributes:** Select which attributes to publish via Modbus. The attribute values reported by a Modbus Slave Device are published using the Holding Registers (40000-49999), which are five-digit addresses. Attributes are categorized as one of two different types:
 - Numeric: (Float, Integer, and Enum) published using two 16-bit registers
 - Boolean: (Boolean) published using one 16-bit register

NOTE: To determine the data type of an attribute, navigate to **Admin Console > Data Schema** and select the attribute to view its details.

- **Attribute Defaults:** Specify the value a Modbus Slave will report if it does not currently have a value for an attribute. This optional setting is often set well out of the possible range of values for use as an alerting indicator. If not specified, the Modbus Slave device will return the default register value of 0.

Modbus Device Settings

- **Slave Device IDs:** Define a Slave ID for this set of sensors to expose. Multiple Slaves can be added. The number of assets reporting to a single slave device depends on the number and type of attributes configured for the device. (Numeric attributes require more Holding Registers than Boolean attributes.) The valid range for the Slave ID is 1-247.

Asset Filter For Publishing Modbus Device Sensor Attributes

- **Filter Asset Type:** Select an asset type to filter by.
- **Filter Location:** Select a location to filter by.
- **Attribute:** Select an attribute to filter by.
- **Value Operator:** Select to filter by value equals, does not equal, in, attribute has value, or attribute has no value (is empty).
- **Value:** Select to filter by a specific value, either equals or does not equal.

NOTE: Filtering, in general is used to limit or reduce the amount of sensors/assets being monitored, so the more focused, the less data. In general, Environmental Sensor can be used for environmental sensors such as Temperature-Humidity.

4. Save changes.

Modbus Slave Addresses

After licensing, enabling, and configuring the Modbus functionality, you can display and/or export the mapping. For each attribute value to be published by the Modbus Slave Devices, Asset Manager will automatically assign a unique Holding Register Address used by Modbus clients to query an attribute's current value. The Modbus Slave Addresses panel allows you to view the Modbus Slave Device ID and the value of the Modbus Holding Register address Asset Manager has assigned to each attribute published via Modbus.

xxx-yyy	DRAFT 283	7/2/2015
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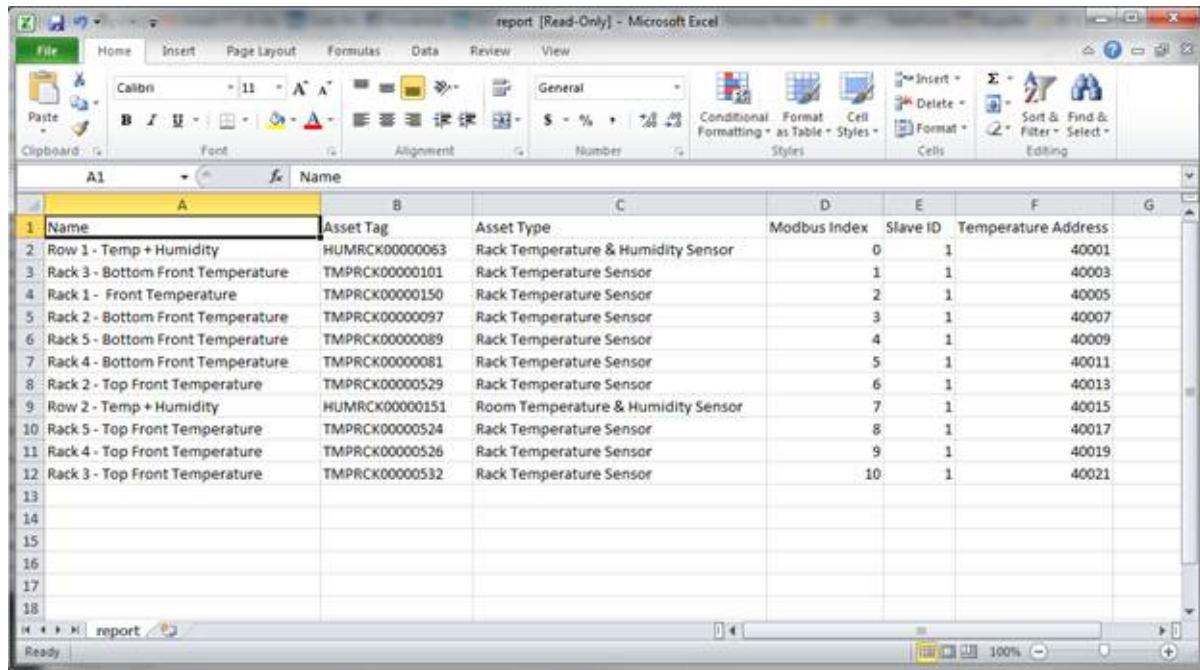
View and/or Export the Modbus Mapping

1. In the **Admin Console**, go to **Integration > Modbus Slave Addresses** tab.
2. Click the desired Slave Device in the middle column (this example uses “Datacenter Temperature”) to display the registers/addresses on the right side of the screen.

Name	Asset Tag	Asset Type	Slave ID	Temperature Address
Temp Sensor 211	TMPRCK00000316	Temperature - Humidity	1	40669
T+H Sensor 116	HUMRCK00000347	Temperature - Humidity	1	40355
Temp Sensor 89	TMPRCK00000133	Temperature - Humidity	1	40615
Temp Sensor 137	TMPRCK00000205	Temperature - Humidity	1	40087
Temp Sensor 125	TMPRCK00000187	Temperature - Humidity	1	40063
Temp Sensor 84	TMPRCK00000126	Temperature - Humidity	1	40605
Temp Sensor 95	TMPRCK00000142	Temperature - Humidity	1	40627
Temp Sensor 214	TMPRCK00000321	Temperature - Humidity	1	40675
Temp Sensor 62	TMPRCK00000093	Temperature - Humidity	1	40561
Temp Sensor 178	TMPRCK00000267	Temperature - Humidity	1	40433

3. To export this mapping, select the desired output format and click the appropriate **Export** button at the top of the screen.

NOTE: The Excel screenshot below shows a CSV-formatted mapping of this particular Modbus integration.



The screenshot shows a Microsoft Excel spreadsheet titled "report [Read-Only] - Microsoft Excel". The table has columns labeled A through G. Column A contains sensor names, column B contains Asset Tags, column C contains Asset Types, column D contains Modbus Indexes, column E contains Slave IDs, and column F contains Temperature Addresses. The data includes various rack temperature and humidity sensors.

Name	Asset Tag	Asset Type	Modbus Index	Slave ID	Temperature Address
Row 1 - Temp + Humidity	HUMRCK00000063	Rack Temperature & Humidity Sensor	0	1	40001
Rack 3 - Bottom Front Temperature	TMPRCK00000101	Rack Temperature Sensor	1	1	40003
Rack 1 - Front Temperature	TMPRCK00000150	Rack Temperature Sensor	2	1	40005
Rack 2 - Bottom Front Temperature	TMPRCK00000097	Rack Temperature Sensor	3	1	40007
Rack 5 - Bottom Front Temperature	TMPRCK00000089	Rack Temperature Sensor	4	1	40009
Rack 4 - Bottom Front Temperature	TMPRCK00000081	Rack Temperature Sensor	5	1	40011
Rack 2 - Top Front Temperature	TMPRCK00000529	Rack Temperature Sensor	6	1	40013
Row 2 - Temp + Humidity	HUMRCK00000151	Room Temperature & Humidity Sensor	7	1	40015
Rack 5 - Top Front Temperature	TMPRCK00000524	Rack Temperature Sensor	8	1	40017
Rack 4 - Top Front Temperature	TMPRCK00000526	Rack Temperature Sensor	9	1	40019
Rack 3 - Top Front Temperature	TMPRCK00000532	Rack Temperature Sensor	10	1	40021

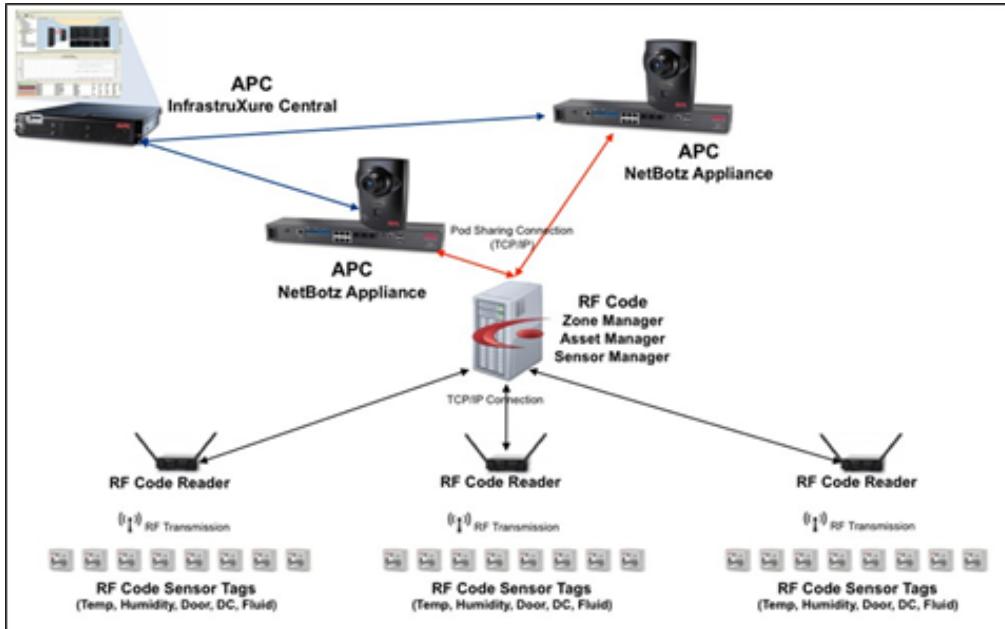
Upon completion and exporting of this mapping, a BMS (data consuming) system should now be able to pull/query information using Modbus TCP from the Asset Manager server.

NOTE: For information regarding how to integrate your Modbus system, please refer to your Modbus manuals or refer to the Modbus website <http://www.modbus.org>.

Integrating with NetBotz

The integration of RF Code sensors with the APC NetBotz solution utilizes the NetBotz Pod Sharing capabilities native to Version 2 & Version 3 NetBotz appliances.

Deployment integration of NetBotz with Asset Manager can be visually displayed as:



The RF Code integration with the APC NetBotz solution supports the following RF Code Sensor Tags:

- R120 Door Sensor Tag
- R130 Dry Contact Sensor Tag
- R135 Fluid Sensor Tag
- R150 Temperature Sensor Tag
- R155 Temperature + Humidity Sensor Tag

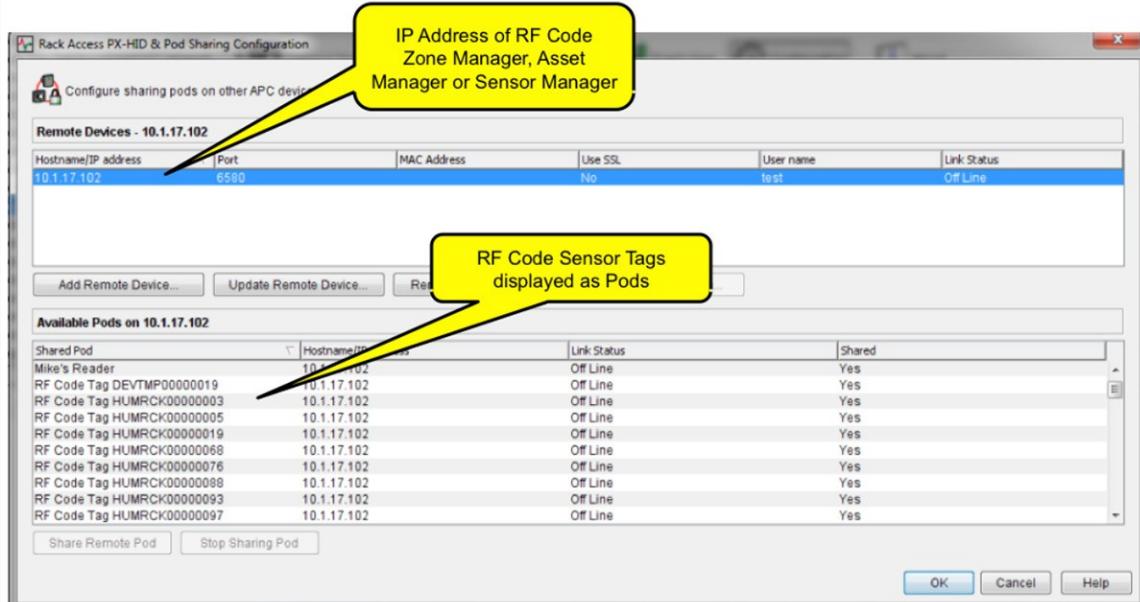
To integrate NetBotz with Asset Manager, perform the following steps:

1. Navigate to the NetBotz Advanced View (for the V2 and V3 appliances).



2. Add a **Remote Device** via Pod Sharing to establish a connection is to the RF Code software.

NOTE: The Remote Device is the IP Address of the Asset Manager server.



3. After the Remote Device is added, a list of available sensors from Asset Manager is displayed.

4. Add the sensors to the NetBotz appliance.

NOTE: Each RF Code Sensor Tag is displayed as a “Pod.”

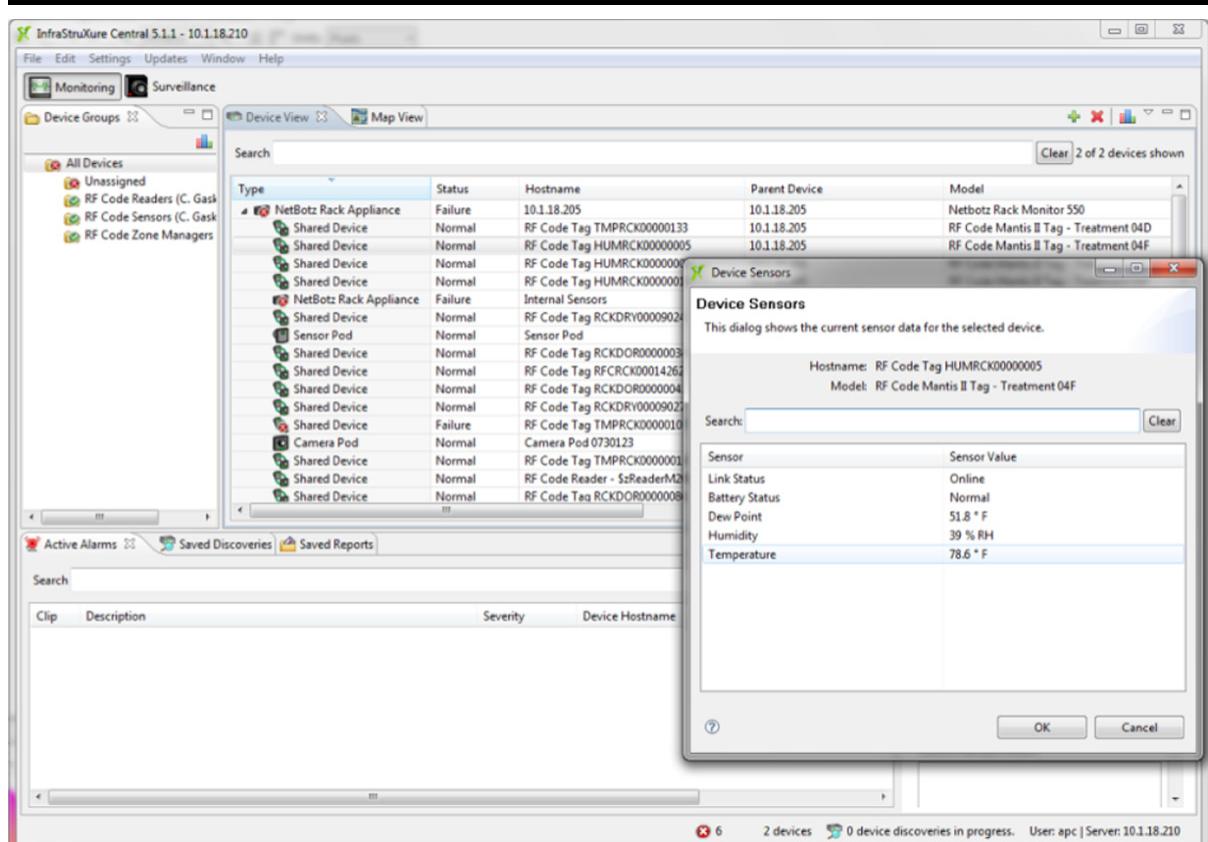
The following table shows which RF Code sensor tags are displayed by which APC NetBotz Pod.

Sensor Tag	Battery Status	Door Status	Dry Contact Status	Fluid Status	Temperature	Humidity	Dew Point
R120 Door Sensor Tag	X	X					
R130 Dry Contact Sensor Tag	X		X				
R135 Fluid Sensor Tag	X			X			
R150 Temperature Tag	X				X		
R155 Temp + Humidity Tag	X				X	X	X

In addition to creating a Pod for each RF Code sensor tag, the integration creates the following pods for each RF Code Reader with the following sensors for the reader:

- **Reader Status:** Disabled, Connecting, Initializing, Initialized, Active, Disconnecting, Disconnected, Reader Failure, Config Failure, Connect Failure, Noise Detected, Access Denied, High Traffic, Unknown.
- **Tag Capacity Used:** The percentage of tag capacity of the reader utilized.

RF Code Sensors will appear as Device Sensors when viewed in InfrastruXure Central.



Standard Approach to Troubleshooting

As with troubleshooting in general, and more specifically with computer issues, it is best to know exactly what actions were taken immediately prior to the error or issue starting. Before contacting RF Code Support, document as many details of the issue as you can.

Also, as when troubleshooting any software application issues, first attempt to isolate the issue to the specific application by eliminating other possible causes for the behavior you are seeing; this encompasses knowing the hardware capabilities and utilization of the Asset Manager application server and database server as well as knowing the network bandwidth limits and use. Standard performance monitoring means are always a good place to start, especially if problems seem to be happening with multiple applications, databases, and/or database instances.

RF Code Support Knowledge Base

The RF Code Support Knowledge Base (support.rfcode.com) is the best resource to use when you encounter an error. Some errors are presented if you are trying to perform an action in the system that is not allowed. Generally, you will find Notes about performing various tasks to help you avoid this type of error, but the Knowledge Base contains further explanation about the causes of these errors and what actions to take to configure and/or use the Asset Manager system properly. Two examples of this kind of error message and the knowledge base articles related to them are the following:

[Delete Failed. The item could not be deleted.](#)

[Asset Manager Cannot Connect to the local Microsoft SQL Express Database](#)

The other major category of error messages appear more like programming or code-based error messages. Some of these are known issues with various versions of Asset Manager and therefore the best solution is to upgrade Asset Manager to the latest version. However, no code is completely without error, so please bring these to the attention of RF Code Support.

An example of this kind of error is the following:

[java.io.IOException: Server returned HTTP response code: 415 for URL](#)

Log Files

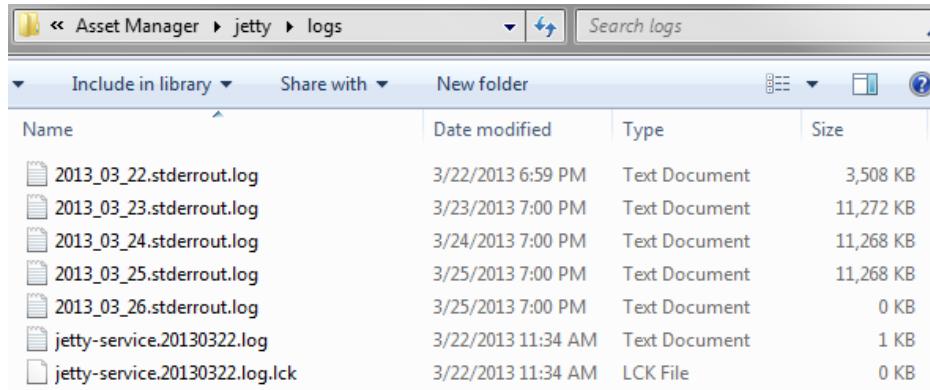
The Log Files section of the Appendix contains information about finding and viewing log files. The Asset Manager log files will contain details about how the code is being executed and why certain tasks might be performing in unexpected ways or not at all.

RF Code Asset Manager logs are and have been part of the HTTP API since Asset Manager version 2.5. In the links below, “IP Address of Asset Manager” is the IP address of the Asset Manager application server.

NOTE: For versions of Asset Manager earlier than 2.5, the logs can only be found at the following file path on the server: \Program Files\RF Code\Asset Manager\jetty\logs and will

xxx-yyy	DRAFT 290	7/2/2015
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look like the following:

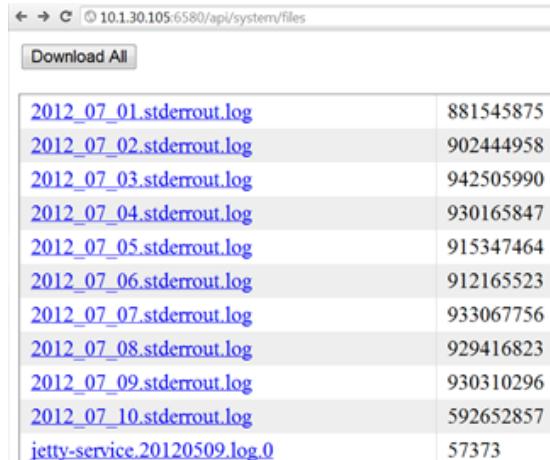


A screenshot of the Asset Manager interface showing a file list. The path is Asset Manager > jetty > logs. The list contains several log files and one lock file:

Name	Date modified	Type	Size
2013_03_22.stderrout.log	3/22/2013 6:59 PM	Text Document	3,508 KB
2013_03_23.stderrout.log	3/23/2013 7:00 PM	Text Document	11,272 KB
2013_03_24.stderrout.log	3/24/2013 7:00 PM	Text Document	11,268 KB
2013_03_25.stderrout.log	3/25/2013 7:00 PM	Text Document	11,268 KB
2013_03_26.stderrout.log	3/25/2013 7:00 PM	Text Document	0 KB
jetty-service.20130322.log	3/22/2013 11:34 AM	Text Document	1 KB
jetty-service.20130322.log.lck	3/22/2013 11:34 AM	LCK File	0 KB

Log files can be downloaded at the following URL:

<http://<IP Address of Asset Manager>:6580/api/system/files>



A screenshot of a web browser displaying a list of log files available for download. The URL is 10.1.30.105:6580/api/system/files. A "Download All" button is visible above the list.

File Name	Last Modified
2012_07_01.stderrout.log	881545875
2012_07_02.stderrout.log	902444958
2012_07_03.stderrout.log	942505990
2012_07_04.stderrout.log	930165847
2012_07_05.stderrout.log	915347464
2012_07_06.stderrout.log	912165523
2012_07_07.stderrout.log	933067756
2012_07_08.stderrout.log	929416823
2012_07_09.stderrout.log	930310296
2012_07_10.stderrout.log	592652857
jetty-service.20120509.log	57373

NOTE: Log files are organized by date in the form of year_month_day.stderrout.log

To change the logging level for various modules within Asset Manager, go to the following URL:

<http://<IP Address of Asset Manager>:6580/api/system/log>

RF CODE

10.1.30.105:6580/api/system/log

com.rfcode

Parent (ALL) ▾	com.rfcode
Parent (ALL) ▾	com.rfcode.alert
Parent (ALL) ▾	com.rfcode.alert.AlertActionEngine
Parent (ALL) ▾	com.rfcode.alert.AlertService
Parent (ALL) ▾	com.rfcode.config
Parent (ALL) ▾	com.rfcode.config.SystemPropertiesService
Parent (ALL) ▾	com.rfcode.dao
Parent (ALL) ▾	com.rfcode.dao.impl
Parent (ALL) ▾	com.rfcode.dao.impl.AttributeClassDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.EntityAccessGroupListDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.EntityDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.EntityRefHistoryDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.EntityTypeDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.InheritedAttributeSupportDaemon\$OurWorkQueue
Parent (ALL) ▾	com.rfcode.dao.impl.MimeObjectDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.TypeRefPathHistoryDaoImpl
Parent (ALL) ▾	com.rfcode.dao.impl.UserAccessGroupListDaoImpl
Parent (ALL) ▾	com.rfcode.database
Parent (ALL) ▾	com.rfcode.database.impl

Statistics regarding the log level can be viewed at:

<http://<IP Address of Asset Manager>:6580/api/system/stats>

10.1.30.105:6580/api/system/stats

—tag-events—

Metric	Count	Mean rate	1min	5min	15min
Tag Events Handled	6581736	5.835	10.646	10.469	10.328
Tag Events Queued	6581746	5.835	10.641	10.466	10.327

Metric	Value
Current Task Batch Size	10
Current Task Name	com.rfcode.tl.ranger.impl.TagUpdateTask
Last Event Timestamp - LOCAL_RANGER	1361894709812 - Tue Feb 26 10:05:09 CST 2013
Ranger Work Queue Size	0
Tag Events Queue Size	10

—history—

Metric	Count	Mean rate	1min	5min	15min
History Values Inserted	9333122	8.274	13.726	12.795	12.535

—inherited-attributes—

Metric	Count	Mean rate	1min	5min	15min
Inherited Updates Changed	111	0	0	0	0.001
Inherited Updates Queued	2229199	1.976	3.786	3.668	3.584



Contact RF Code Support for assistance if you need to review log files in order to troubleshoot an issue.

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start on right (odd number) pages.

Admin Console and User Console Task Overview

The following tables provide a high-level overview of the Tasks and Sub-Tasks, that is, the features and functionality, available within both the Admin Console and the User Console.

Admin Console Task and Sub-Task Matrix

Task / Sub-Task	Description
Dashboard	Configuration of System Status Dashboards
System Status	Provides high-level visibility to the condition of the Asset Manager system (configuration, active logins, Zone Manager status, and Reader status)
Configuration	
Database	Settings for pointing the Asset Manager server application to your Asset Manager database instance and server.
License Keys	Configuration of license keys to enable you to add more resources to or features within Asset Manager.
SMTP Server	Settings for configuring your mail and messaging system.

xxx-yyy	DRAFT I	7/2/2015
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Task / Sub-Task	Description
Import Configuration	Options for importing system, tag group, reader, location, and/or rule configuration from another or previous instance of Asset Manager.
Export Configuration	Settings to enable the export of your system configuration and/or schema, including SMTP, Zone Manager, Readers, Tag Groups, Locations & Rules, Users, Alert Actions & Alert Thresholds, Asset Templates & Views, Dashboards, Folders, Maps & Map Views, Reports, Graphs & Actions, Events Triggers & Actions, Integration, Binary Data, Format, and Schema
Tag Groups	This is where the different “types” of sensor and asset tags managed by the system are defined.
Zone Managers	Control Panel for Zone Managers, including adding, configuring, removing, enabling, and disabling.
Zone Manager Status	A view only screen showing current status of the Zone Managers currently being managed by Asset Manager.
Readers	Control Panel for the Readers managed by Asset Manager. Adding, removing, configuring, enabling, and disabling Readers is handled here.
Reader Firmware	This section provides a current view in to the firmware of the Readers, a way to upload new firmware to the Asset Manager, which can then be installed to the Readers, either in mass or individually.
Reader Status	A view only screen dedicated to the status and

Task / Sub-Task	Description
	characteristics of the currently managed Readers.
GPS	For deployments using GPS receivers attached to Readers, this section allows for GPS filters to change the granularity and level of detail at which GPS data will be reported. Also a screen to view current GPS status of all Readers and their respective GPS receivers.
Serial Devices	This screen is very simply a listing of all attached (via USB to Readers) serial devices and a group access designation, which is not necessary, but can be configured.
Server	<p>This screen allows for the following Configuration Options:</p> <ul style="list-style-type: none"> • Units of Measure or Server Locale: English, Metric • Server Time Zone: View of the current Time Zone • Asset Security: Enabling/disabling of “Advanced Asset Security” • Location Behavior: Configuration of default behavior designation for when to place an asset in the “Unknown Location” location • Never: The asset will never be placed in the Unknown Location folder • Asset is offline: Put the asset in the folder only after it has gone offline

Task / Sub-Task	Description
	<ul style="list-style-type: none"> No matching location rules: If it's still online, but doesn't match any location rules, place it in the Unknown Location folder Asset is offline or no matching location rules: Combines the previous two options, and if either matches, move the asset to Unknown Location
Integration	
JMX Monitor	License-enabled feature. Contact RF Code Support.
JMX Domains	License-enabled feature. Contact RF Code Support.
BACnet Slave Server	License-enabled feature. Contact RF Code Support.
BACnet Slave Devices	License-enabled feature. Contact RF Code Support.
BACnet Slave Object IDs	License-enabled feature. Contact RF Code Support.
Modbus Slave Server	License-enabled feature. Contact RF Code Support.
Modbus Slave Devices	License-enabled feature. Contact RF Code Support.
Modbus Slave Addresses	License-enabled feature. Contact RF Code Support.

Task / Sub-Task	Description
Location/Rules/Maps	
Locations & Rules	Locations and their associated Rules are built in this section
Map Configuration	Creating and modifying maps and their associated reference points is handled in this section. Maps are viewed in the User Console, build and managed here.
Map Views	Map views, which are created and managed in this section, are filters and customizations, for use in the User Console Maps, that allow for different attributes to be overlaid on the Maps
Location to Asset Association	This section is where Summary Assets are created and applied to their respective locations
Data Schema	
Asset Attributes	This is where attributes are managed for use with assets, also could be considered custom properties/fields to be applied to assets that can be entered or modified
Status Attributes	Status attributes are generally considered to be attributes that are native to a tag that can be changed from the state of one of the sensors on that tag, for example tamper, motion, temperature
Calculated Asset Attributes	This section allows for creation and modification of more advanced attributes which can contain formulas and automated calculations
Asset Types	Creating Asset Types and applying/changing the different attributes that apply to assets is done in

Task / Sub-Task	Description
	this section
Custom Attribute Types	More advanced, dependency based attributes can be created and modified in this section, such as: temperature sensor profiles
Schema Import	Pre-defined schemas are loaded in this section which change the Asset Types and various Attributes populated in the system
Security	
Users	User accounts created and modified here
Groups	User Groups are created and managed here for a more efficient security model when dealing with multiple users
LDAP Server	Configuration of LDAP authentication for user authentication is handled here
User Audit Trail	Track user activities, such as logins and major system modifications in this section
Reports/Graphs	
Manage Reports	Create, modify, schedule, and run detailed Reports in this section, reports are related to system activity, not assets in this section
Reports	View previously run Reports and export their output here
Manage Graphs	Create, modify, schedule, and run detailed Graphs in this section, graphs are related to system activity, not assets in this section

Task / Sub-Task	Description
Graphs	View previously run Graphs and export their output here
Actions	Manage and create the potential actions for Reports & Graphs, that is email actions to send graphs
BIRT Templates	Configure advanced reports.
Events	
Actions	Create and modify the output mechanisms for sending data from events outside of Asset Manager, for example email, snmp traps
Triggers	Roughly equivalent to a threshold, triggers allow for filters and parameters to be set on system metrics to enable events to be sent
Alert Management	
Alert Viewer	View active and historical alerts generated by threshold breeches
Actions	Create and modify the output mechanisms for sending data from alarms/alerts outside of Asset Manager, for example email, snmp traps
Thresholds	Parameters and filters for defining when a system-level alert should be triggered
Global Alert Policy	Option for temporarily suspending alarms and their thresholds so alerts don't occur during a planned outage or other scenario

User Console Task and Sub-Task Matrix

Global Search	Multiple search parameters can be entered into the global search field and the results returned in one table (parameters are not “anded” together)
Dashboard	Creation, modification, and organization of asset Dashboards is accomplished in this section
Tag Management	
Manage Tags	Finding, discovering, and adding detected tags to the unassigned tag queue, then creating assets can be accomplished here
Tag Summary	Viewing summary counts for all types of tags, broken down by Tag Groups, being used and detected (unused) by Asset Manager
Customization	
Asset Templates	Asset Templates allow for easy creation of assets by pre-populating attributes in template, and are managed in this section
Views	Customizing asset views allow for the specification of different column headings (asset attributes) to view assets in the asset grid with custom columns
Assets	

Manage Assets	Table view of all assets being managed by the system, filterable using the filter bar along the top of the view
Manage Assets By Location	Pre-defined filter(s) to view assets by their current location, selectable by using the location hierarchy
Manage Assets By Type	Pre-defined filter(s) to view assets by their respective type, for example Server, temp sensor, or IT Rack summary assets
Import Assets	Upload asset lists in this section
Asset Builder Jobs	Rarely used. Contact RF Code Support.
Access Control	Rarely used. Contact RF Code Support.
Maps Map Views	Accessing and navigating maps created in the Admin Console Map Configuration section
Reports/Graphs	
Manage Reports	Create, modify, schedule, and run detailed Reports in this section, reports are related to asset activity
Reports	View previously run Reports and export their output here
Manage Graphs	Create, modify, schedule, and run detailed Graphs in this section, reports are related to asset activity
Graphs	View previously run Graphs and export their output here
Actions	Manage and create the potential actions for Reports & Graphs, that is email actions to send graphs
BIRT Templates	Configure advanced reports.

Events	
Actions	Create and modify the output mechanisms for sending data from events outside of Asset Manager, for example email, snmp traps
Triggers	Roughly equivalent to a threshold, triggers allow for filters and parameters to be set on system metrics to enable events to be sent
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Alert Viewer	View active and historical asset alerts generated by threshold breeches
Actions	Create and modify the output mechanisms for sending data from alarms/alerts outside of Asset Manager, for example email, snmp traps
Thresholds	Parameters and filters for defining when a system-level alert should be triggered

Displaying Values in the English or Metric System

To change the display of values in the web interface so that they read as English or metric measurements, for example temperature in Fahrenheit vs. Celsius, navigate to **Admin Console > User Access > Users > Region Settings > Units Display** and change the setting to **English** (or Browser/OS Locale). The latter setting will change the display of values to match those of your local computer or regional/locale settings. To display values in metric measurements, set Units Display to **Metric**.

To change the display of values in reports and alerts so that they read as English measurements or metric measurements, for example, temperatures in Fahrenheit vs. Celsius, navigate to **Admin Console > Configuration > Server > Region Settings** and change the setting to **English** (or Server Operating System Locale).

Reader Configuration with the Reader Configuration Utility

In order for Asset Manager to be able to detect your readers, the readers must first be configured with the Reader Configuration Utility. Below is an overview of the process.

NOTE: For complete instructions, refer to the Reader Configuration Utility (RCU) User Guide, which ships with your reader and which is also available from the RF Code Support Document Repository: <http://support.rfcode.com/customer/portal/articles/722910>

To configure a reader with the RCU, perform the following steps:

1. After installing the application from the CD, select **Start > All Programs > RF Code > Reader Configuration Utility > RF Code Reader Configuration Utility** to launch the application.

The main screen appears.

2. Click **Network** and then click **Next** to begin the setup.

NOTE: The Network setup option is used to configure a reader that is connected to a network by means of an Ethernet connection; this setup option is generally used for production environments, particularly in data centers where one or more readers will be mounted above server rows. The Local setup option is used to configure a reader that is connected to your PC by an RS-232 serial cable or a USB cable; this setup option is generally used only for smaller deployments and/or the initial configuration of the reader and is described in the Reader Configuration Utility User Guide. This manual only contains basic configuration instructions using the Network option.

xxx-yyy	DRAFT XI	7/2/2015
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The main setup screen will open and at the top is a Reader Address field to enter the IP address of a reader.

NOTE: Initially this field displays the factory default IP address (192.168.1.129) assigned to all readers.

3. Click the **Connect** button to connect to the reader.

NOTE: Network settings are grayed out during a connection attempt. If necessary, choose the Stop button to terminate a connection attempt if the reader cannot be located or you want to enter another IP address.

4. Complete any other configuration options you need per your network.
5. Click the **Apply Settings** button.
6. Click to go back to the **Network** tab and then click the **Finish** button to close the application.

Reader Configuration with the Reader Web Interface

To see RF Code tags within range of the reader and to help determine proper placement and functioning of readers and/or tags, perform the following steps:

NOTE: The Reader Web Interface can be useful when troubleshooting reader and tag issues after full deployment when you are in “maintenance” or “sustaining” mode.

1. Physically connect your LAN to your RF Code reader.
2. Find the unique hostname of the reader, which can be found on a white label on the underside of the reader labeled "DEFAULT HOST NAME."

NOTE: You should have the IP address of the reader after configuring it with the RCU, but you can also ping the hostname of the reader from a Command Prompt to get its IP address.

xxx-yyy	DRAFT XII	7/2/2015
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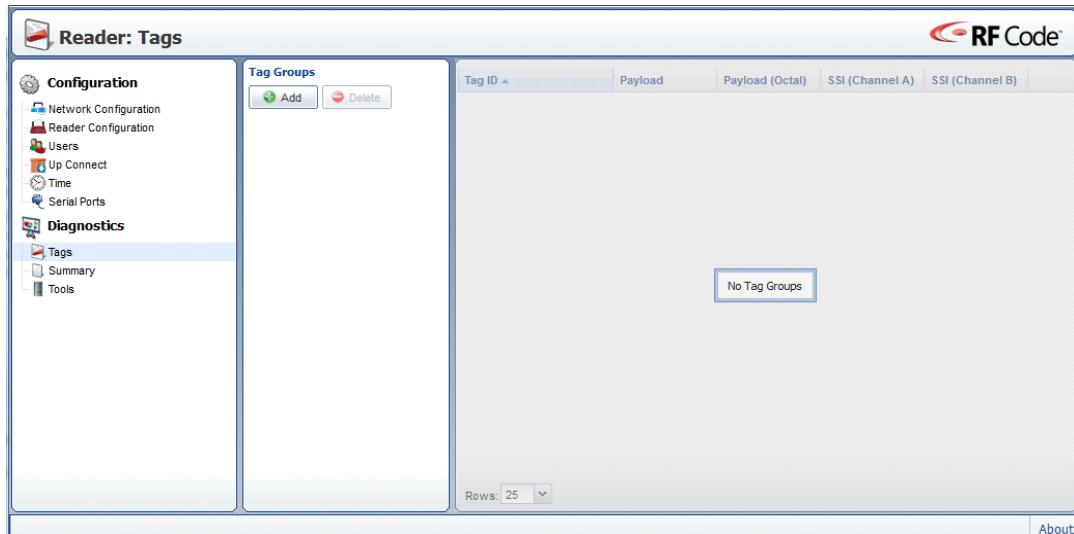
3. Take the hostname of the device and prepend it to the LAN domain to which the reader is connected. The URL follows the pattern of [DEFAULT HOST NAME + LAN Domain]. The following is an example:

DEFAULT HOST NAME: **rfcodeab1cd2**

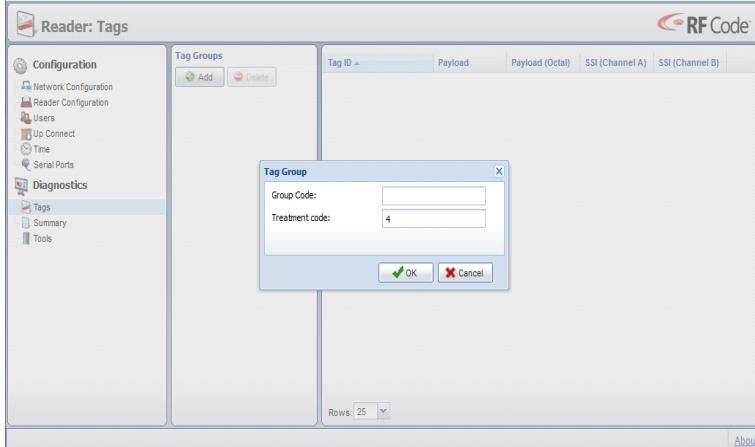
LAN Domain: **domain.com**

NOTE: In the example above, the full URL would be <http://rfcodeab1ab2.domain.com>

4. After physically connecting the reader to the LAN and determining the IP address and/or URL, browse to it and open the reader web interface (the browser GUI).



5. Click **Tags** in the left-hand column.
6. Under the **Tag Groups** heading in the next column to the right, click the **Add** button and you will see the **Tag Group** dialog box appear on your screen:

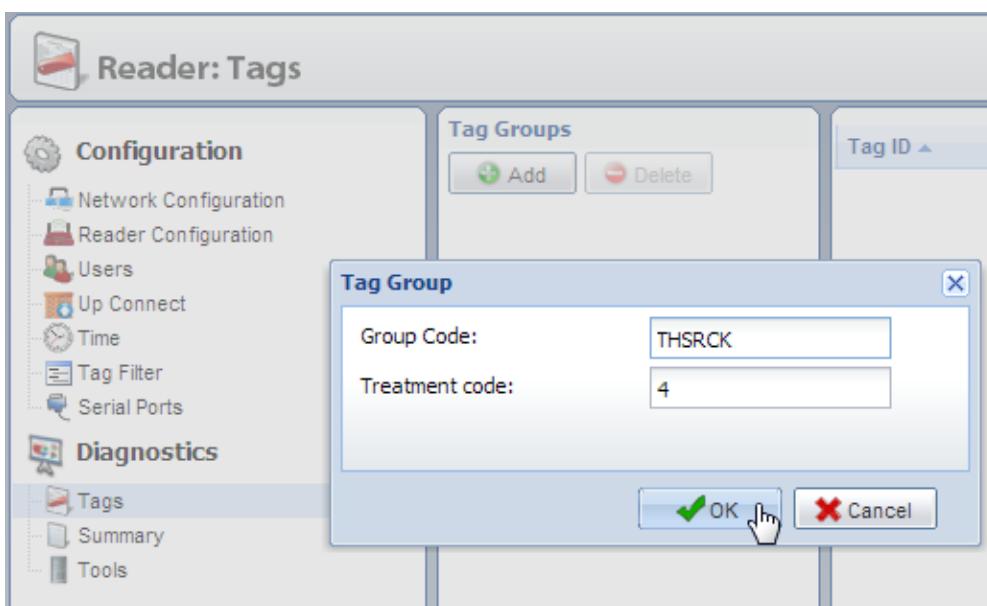


- In the Group Code field of the Tag Group dialog box, type the **Group Code** of any of your tags. The Group Code is a 6-character code found on the bottom left of a tag, right below the barcode.

NOTE: For more information about tags, Group Codes, Tag IDs, and Treatment Codes, refer to the [RF Code Tags](#) section in the Appendix.

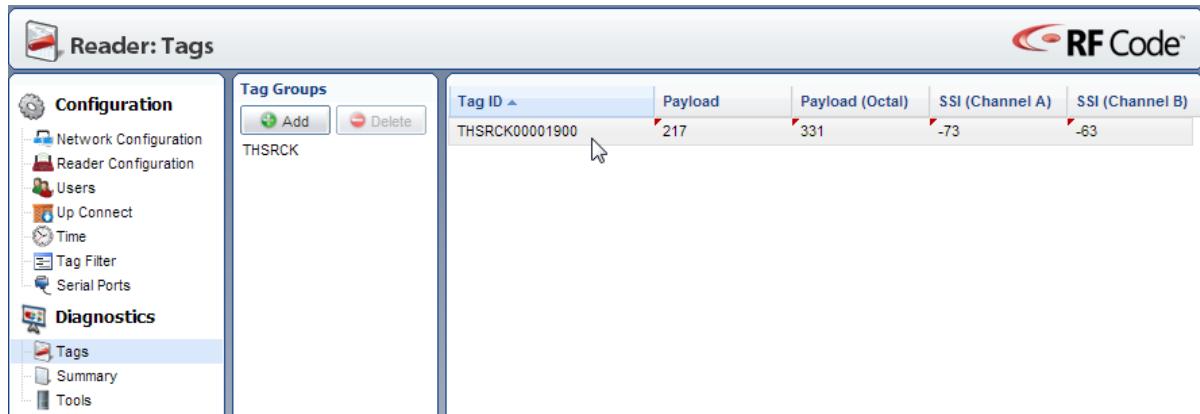
- After entering a Group Code, click the **OK** button.

In the sample below, the Group Code THSRCK is in the Group Code field:



NOTE: This part of the reader configuration is simply a quick test. You will need to add all of the Group Codes for all of your tags in the Asset Manager web interface.

After adding the Group Code, the reader will see all of the tags in range with that Group Code and will begin to report information about the beacons they are transmitting in the far right window pane, listing each tag by Tag ID.



The screenshot shows the 'Reader: Tags' page of the RF Code Asset Manager. On the left, there's a sidebar with 'Configuration' and 'Diagnostics' sections. Under 'Diagnostics', 'Tags' is selected. In the center, there's a 'Tag Groups' section with an 'Add' button and a 'Delete' button. Below it, the group code 'THSRCK' is listed. To the right is a table with columns: Tag ID, Payload, Payload (Octal), SSI (Channel A), and SSI (Channel B). A single row is shown for the tag THSRCK00001900, with values 217, 331, -73, and -63 respectively. The 'RF Code' logo is in the top right corner.

Tag ID	Payload	Payload (Octal)	SSI (Channel A)	SSI (Channel B)
THSRCK00001900	217	331	-73	-63

You can see that under the middle column (labeled “Tag Groups”), the Group Code of “THSRCK” is displayed (the one that was just added in the example above), and tags with that Group Code that the reader sees will begin to appear in the right column. For each unique tag, the basic attributes of the tag beacons (payload and signal strength indicator (SSI) values) are shown.



A zoomed-in view of the tag table from the previous screenshot. It shows a single row for the tag THSRCK00001900 with payload 217, octal payload 331, and SSI values -73 and -63 for both channels A and B. A cursor arrow points to the bottom right of the table.

Tag ID	Payload	Payload (Octal)	SSI (Channel A)	SSI (Channel B)
THSRCK00001900	217	331	-73	-63

The signal strength indicator provides a measure of how strong a reader is reading tag signals. It can be an important indicator in deployment areas with a large degree of noise in the environment. However, if you do need to address environmental noise and are considering making changes to SSI configuration of any reader, please contact RF Code Support first. Misconfiguring SSI can cause a reader to miss some tag beacons at best and at worst prevent a reader from being able to detect any tag beacons or tags.

In general you want tag SSI to be 10 dB higher than the noise floor. If you need to configure SSI to limit zones, the Simple SSI rule is the easiest to use.

NOTE: Adding Tag Groups in the Reader Web Interface is only a way to validate that the reader is functioning properly. These settings are not saved after the web interface session is ended. The reader and tag groups must be configured within Asset Manager (in a similar way) in order for them all to work together within Asset Manager.

RF Code Tag Group Codes, IDs, and Treatment Codes

All RF Code tags have three distinguishing characteristics, regardless of the type, model, or function of the tag. In the example below is an R155 Temperature/Humidity Tag.

Outlined in the following photo in red rectangles are the three characteristics that distinguish this tag (and all individual tags) from every other tag:



Group Code: The Group Code is a six-letter code. Examples of this code are THSRCK, LOCATE, IRCODE, HUMRCK, and RFCRCK.

Tag ID: The Tag ID is a unique eight-digit numeric identifier. You might have 2,000 THSRCK tags in your environment, but you can only have one with the Tag ID of 00001900.

Treatment Code: The Treatment Code is used together with the Group Code to tell RF Code software how to interpret the data that each tag sends in beacons to RF Code readers. A Treatment Code can be associated with multiple Group Codes, so it is important to match them exactly when adding them to a specific environment of RF Code readers and tags. Note that all tags currently shipped by RF Code (as of November 2012) use Treatment Code 04.

All RF Code tags are defined as being members of a specific group, and have a unique tag ID number within that group. When an RF Code reader is configured, it can be supplied with up to eight group code IDs and a corresponding treatment code for each group code. The treatment code instructs the reader how to interpret the payload data for each tag event within that group code. RF Code tags are smart and have the ability to transmit various types of data within its radio frequency beacon such as indicators for motion, panic, tamper, infrared location, and low battery.

Advanced Reader Configuration

Advanced Reader Configuration fields are available to you when configuring RF Code readers. Authentication allows an ID and password to be set for additional security. Up Connect is used if firewalls prevent Asset Manager from initiating contact with RF Code Readers. Other settings are rarely changed; contact Support for guidance if required.

Authentication	
User ID:	<input type="text"/>
Password:	<input type="password"/>
Confirm Password:	<input type="password"/>
Up Connect Settings	
Up Connection Enabled:	<input checked="" type="checkbox"/>
Up Connection Reader ID:	<input type="text"/>
Up Connection Password:	<input type="password"/>
Confirm Password:	<input type="password"/>
Position Settings	
Position Source:	<input type="text"/> None <input type="button" value="X"/> <input type="button" value="▼"/>

Authentication

- **User ID:** Your user name or user ID
- **Password:** A user-defined password.
- **Confirm Password:** The same password again entered to confirm.

Up Connect Settings

- **Up Connection Enabled:** If you are configuring an Up-Connection Reader that you would like to go active and receive and transmit tag data once you configure it within Asset Manager, this box should be checked.

Please refer to the [Reader Configuration Utility User Manual](#) for more information.

- **Up Connection Reader ID:** The ID that was assigned when you configured your reader as an up-connection reader should be entered in this field.
- **Up Connection Password:** If you assigned a password when you configured your Up-Connection reader with the Reader Configuration Utility, you will need to enter and confirm the password for use with Asset Manager.
- **Confirm Password:** Enter the same password again.

xxx-yyy	DRAFT XVIII	7/2/2015
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NOTE: The following sections are generally not used, and should be done with caution and planning.

Position Settings

- **Position Source:**

- If your reader is not going to use a GPS location, then leave the default setting of **None**.
- If you are going to connect the reader to a GPS device, select **Reader GPS** to enable it to report its GPS coordinates and to filter GPS data. Doing so will present you with additional fields related to configuring GPS settings.

- **Minimum Tag SSI for Position Match:** Input the minimum SSI value required that will indicate that the tagged asset will match the position of the reader to indicate the GPS location.

- **GPS Data Reporting:** For this field, choose which GPS data you want reported in the Asset Manager system.

- **Minimum GPS Update Period:** Select this checkbox to use global settings or enter a value.

- **Minimum Horizontal Change:** Select this checkbox to use global settings or enter a value.

- **Minimum Vertical Change:** Select this checkbox to use global settings or enter a value.

- If you would like to set a static GPS location for the reader, select **Static Position**, enter the **Minimum Tag SSI for Position Match** (described above), and then manually enter its GPS coordinates in **Reader Position** field that becomes visible.

xxx-yyy	DRAFT XIX	7/2/2015
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Advanced Settings

Advanced

SSI Change Threshold*:	3	dBm
SSI Cutoff (Channel A)*:	0	dBm
SSI Cutoff (Channel B)*:	0	dBm
Tag Age-Out Time*:	60	seconds
Tag Age-Out Time (Channel A)*:	30	seconds
Tag Age-Out Time (Channel B)*:	30	seconds
Tag Age-Out Time (Reader Offline)*:	60	seconds
Tag Age-In Count*:	0	
Channel Bias (Channel A)*:	0	dBm
Channel Bias (Channel B)*:	0	dBm
Report Tag Controller Events:	<input type="checkbox"/>	
Join Reader Channels:	<input type="checkbox"/>	
Merge Reader Channels:	<input type="checkbox"/>	
Fault In Mask:	<input type="text"/>	
Fault In Value:	<input type="text"/>	
Change Ignore Mask:	<input type="text"/>	

- **SSI Change Threshold:** <min-ssi-change> is a parameter that allows messages that report small Signal Strength Indicator (SSI) value changes to be treated as unchanged. Any message where all the SSI values reported are <min-ssi-change> or less dBm different from the previously reported message will be considered to have not changed. The default value is 3.
- **SSI Cutoff (Channel A, B):** sets the channel SSI threshold to the respective dBm (fixed threshold value). RF Code reader limitation is 41 to 115 dB. This feature is used to reduce the effective read range of a reader. For example, entering a value of 68 for channel A and B will cause tags that are read at -68dB or less to not be reported. In general, tags that are further away from a reader have lower SSI values.
- **Tag Age-Out Time:** is the number of seconds since the last successful message read from a tag before the tag is considered lost. The allowed values range from 10 to 32767. The default value is 60 seconds. If the value is set to 0, the tag timeout is infinite. A tag that has not been seen by a reader for “n” seconds will be reported as not present.
- **Tag Age-Out Time (Channel A, B):** functions the same as Tag Age-Out Time, but is channel-specific.

- **Tag Age-Out Time (Reader Offline):** is the length of time to keep tags in the system if a reader goes offline. “n” seconds after a reader goes offline the tags that had been reported by this reader will be reported as offline.
- **Tag Age-In Count:** is an optional parameter used to tell the reader to not report messages from a tag until “n” messages have been received from that tag. This allows the option of ignoring tags that may appear for a short period of time (for example, due to a tag isolation box being opened for a few seconds).
- **Channel Bias (Channel A, B):** allows for a compensation offset value to be added when different gain antennae are used.
- **Report Tag Controller Events Checkbox:** enables a reader to report events that occur when using the RF Code Tag Controller.
- **Join Reader Channels Checkbox:** combines a reader’s channel A and B into a single channel, by evaluating the raw samples and reporting the strongest single sample stream.
- **Merge Reader Channels Checkbox:** enables a reader’s channel A and B to be merged into a single channel, by combining the raw samples into an average single sample stream.
- **Ignore Low Confidence Initial Beacons:** enables a reader to ignore the first payload if subsequent beacons more closely meet parameters.
- **Fault In Mask:** is the first tag payload filter and limiting function that is set in octal values.
- **Fault In Value** is the second tag payload filter and limiting function that is set in octal values.
- **Change Ignore Mask:** is the third tag payload filter and limiting function that is set in octal values.

Reader Partitioning	
Reader Partition Count:	<input type="text" value="1"/>
Reader Partition Index:	<input type="text" value="0"/>
Reader Partition Rotation Time:	<input type="text" value="0"/> seconds
Diagnostics	
Noise Threshold*:	<input type="text" value="-80"/> dBm
Tag Event Rate Threshold:	<input type="text" value="0"/>
Serial Port	
Serial Driver:	<input type="text" value="bridge"/>

Reader Partitioning

- **Reader Partition Count:** This indicates the number of portions the tag ID range will be divided into. The value must be from 1 to 32, and must be greater than the Reader Partition Index. The default is 1.
- **Reader Partition Index:** This indicates which portion of the range of tag IDs the reader will observe (specifically, what the remainder must be when the tag ID is divided by the Reader Partition Count). The value must be from 0 to 31, and must be less than the Reader Partition Count. The default is 0.
- **Reader Partition Rotation Time:** This specifies the amount of time that the reader is reset to observe tag IDs of the next partition index. The default is 0, which will not reset the reader to observe tag IDs of the next partition index.

For additional in-depth information about Reader Partitioning, consult the following RF Code Support KB article: <http://support.rfcode.com/customer/portal/articles/846730>

Diagnostics

- **Noise Threshold:** This is the threshold for Asset Manager to send an alert for excessive RF noise in the system, as detected by the reader (“D” command for noise level). If the noise is excessive, the reader performance is compromised.
- **Tag Event Rate Threshold:** This is the threshold that will determine high reader event activity.

Serial Port

- **Serial Driver:** Choose the serial driver parameters used to communicate with the serial device. This should be indicated with the literature that came with the device.

For additional information, consult the following KB article: [sup-port.rfcode.com/customer/portal/articles/728501](http://support.rfcode.com/customer/portal/articles/728501)

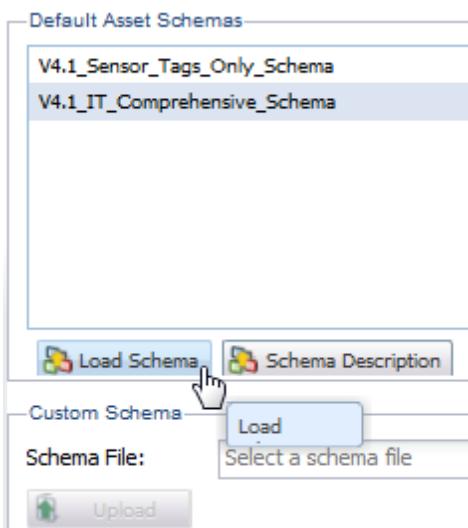
xxx-yyy	DRAFT XXII	7/2/2015
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Default Asset Schemas

Asset Manager is packaged with two default Asset Schemas that you can import and use immediately to prepare the system and then quickly begin to start managing it effectively. One schema is tailored for environmental monitoring with the use of RF Code sensor tags. The other is a more robust schema that includes everything in the first, but also adds a host of other asset types and attributes for a much more powerful and mature application of active RFID tags and readers.

The two Default Asset Schemas available immediately for import are V4.1_Sensor_Tags_Only_Schema and V4.1_IT_Comprehensive_Schema. The first is designed with environmental monitoring in mind and contains asset types and attributes suited to monitoring temperature, humidity, air pressure, power, etc. in your deployment environment. The second contains all of the asset types and attributes in the first, but it also contains common Inventory asset types and attributes, suitable for managing the assets in data centers, hospitals, industrial deployment environments, offices, etc.

To load either default asset schema, click the **Load Schema** button.



NOTE: In order to view a description of and a detailed list of the specific asset types, attributes, etc. contained within either schema, click to highlight the schema and then click the **Schema Description** button. The same information from each description is presented below, but it can be accessed from within the Asset Manager web interface at any time as well.

While one schema is more extensive than the other, both are extremely comprehensive. As such, you will probably not need all of the Asset Types and Asset Attributes that become available to you after you import one or the other schema. If you want to delete those types and attributes that you do not need or will not need in the near future, there is no harm in doing so. You can always add them back later. In addition, if there are any types or attributes that you will need and which are not included in either schema, please contact RF Code Support for assistance. It's not prohibitively difficult to create them on your own and the system easily allows this, but if you are new to Asset Manager, then you might create more than you need or create them in a way that is not optimal or effective for your specific needs. RF Code Support and RF Code Professional Services are resources available; our team is always ready to assist you in the management of your assets and the monitoring of your environment.

The two default schemas are described in detail below.

V4.1_Sensor_Tags_Only_Schema

This schema is designed to be used to monitor sensors in a data center environment.

Schema Details

The V4.1_Sensor_Tags_Only_Schema focuses its environmental monitoring approach around classifying sensors based on where in the airflow they reside. Intake and exhaust temperatures are monitored on a per point, per rack, per row and even at a data center bases. RF Code also introduces live and historical temperature delta information for hot and cold sides of racks, rows, and cold/hot aisle containment setups. While sensor points are monitored individually, as more sensors are added key summarized stats simply become more accurate instead of simply more numerous. RCI (Rack Temperature Index) and RTI (Return Temperature Index) which are used in determining compliance with data center thermal guidelines are incorporated in this schema.

This schema is designed to handle the following RF Code environmental monitoring sensor tags:

xxx-yyy	DRAFT XXIV	7/2/2015
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- Temperature sensor tags
- Humidity and Temperature sensor tags
- Fluid sensor tags
- Door sensor tags
- Dry Contact sensor tags
- PDU sensor tags
- Differential air pressure tags

NOTE: For RF Code Asset Manager Users, all information included in this schema is already included in the V4.1_IT_Comprehensive_Schema.

This schema is targeted towards deployment of the RF Code sensor solution indoors and more specifically IT type locations.

The schema **Asset Types** are organized as follows:

- Asset
- Inventory
- Sensor
- Differential Pressure
- Door
- Dry Contact
- Fluid
- PDU
- PDU Breaker
- PDU Feed Line
- PDU Input Channel
- PDU Outlet

xxx-yyy	DRAFT XXV	7/2/2015
---------	--------------	----------

- PDU Phase
- Temperature - Humidity
- Summary - Location
- Campus
- Building
- Floor
- Zone
- Room
- Country
- State or Province
- City
- IT Area
- Computing Facility
- Data Center
- IT Room
- Wiring Closet
- CRAC Unit
- Rack
- Row of Racks

The schema contains the following **Asset Attributes**:

- Airflow Position
- Building Environmental Monitoring
- CRAC Airflow Position

xxx-yyy	DRAFT XXVI	7/2/2015
---------	---------------	----------

- CRAC Cooling Capacity
- Door Sensor Application
- Equipment Power Outlet 1
- Equipment Power Outlet 2
- Equipment Power Outlet 3
- Equipment Power Outlet 4
- IT Environmental Monitoring
- Rack Environmental Monitoring
- Rack PDU 1
- Rack PDU 2
- Rack Position
- Rack Power Capacity
- Rack Power Monitoring
- Row Environmental Monitoring
- Row Power Monitoring
- Temperature Sensor Application
- Volumetric Air Flow Rate

The schema contains the following **Calculated Attributes**:

- Any Door Open
- Any Doors Last Opened
- Any Fluid Detected
- Any Sensor Offline
- Average Exhaust Temperature

xxx-yyy	DRAFT XXVII	7/2/2015
---------	----------------	----------

- Average Humidity
- Average Intake Temperature
- Average Intake Humidity
- Average Return Humidity
- Average Return Temperature
- Average Return Temperature (Weighted)
- Average Temperature
- Average Temperature Delta
- Calculated Max Alert Severity
- Cold Aisle Containment Door Link (Hidden)
- Cold Aisle Door Open
- CRAC Return Humidity Link
- CRAC Return Temp Link
- CRAC Supply Humidity Link
- CRAC Supply Temp Link
- CRAC Temperature
- Door Counter
- Door Opens per Day
- Equipment Active Power
- Equipment Apparent Power
- Fluid Sensor Count
- Intake Humidity Link (Hidden)
- Intake Temp Link (Hidden)

xxx-yyy	DRAFT XXVIII	7/2/2015
---------	-----------------	----------

- Last Door Opened
- Max Exhaust Humidity
- Max Exhaust Temperature
- Max Intake Humidity
- Max Intake Temperature
- Maximum Humidity
- Maximum Temperature
- Minimum Humidity
- Minimum Temperature
- Rack Active Power
- Rack Apparent Power
- Rack Cooling Index - RCI(HI)
- Rack Cooling Index - RCI(LO)
- Rack Door Status Link (Hidden)
- Rack Power % Capacity
- Rack Temperature Delta
- RCI(HI) Violation
- RCI(LO) Violation
- Return Temperature Index (RTI)
- Room Active Power
- Room Apparent Power
- Row Active Power
- Row Apparent Power
- Sensor Offline Link (Hidden)

xxx-yyy	DRAFT XXIX	7/2/2015
---------	---------------	----------

- Total Rack Cooling Index - RCI(HI)
- Total Rack Cooling Index - RCI(LO)
- Weighted CRAC Return Temp
- Weighted CRAC RTI Cooling
- Weighted CRAC Supply Temp

The schema contains the following **Custom Attribute Types**:

- Building Environmentals
- Computing Facility Environmentals
- CRAC Airflow Profile Environmentals
- CRAC Environmentals
- Door Sensor Profile
- Location
- Power Outlet Monitoring Profiles
- Rack Environmental (Sensors)
- Rack Power Profiles
- Row Environmental Tracking
- Row Power Tracking
- Temp Airflow Profile
- Temperature Sensor Profile

V4.1_Comprehensive_Schema

The V4.1_Comprehensive_Schema is designed to let you track your valuable enterprise IT and standard office assets, as well as employees and other people that enter your managed environment. The

xxx-yyy	DRAFT XXX	7/2/2015
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schema supports the entire RF Code lines of both asset tags and environmental monitoring sensor tags.

Schema Details

This detailed schema for IT assets, office assets, and people/employees has a large number of Asset Attributes and Calculated Attributes as well as the full list of system Standard Attributes.

The V4.1_Comprehensive Schema focuses its environmental monitoring approach around classifying sensors based on where in the airflow they reside. Intake and exhaust temperatures are monitored on per point, per rack, per row and even at a data center. This schema also includes live and historical temperature change (delta) information for hot and cold sides of racks, rows, and cold/hot aisle containment setups. Sensor points are monitored individually, but as more sensors are added to Asset Manager the key summarized stats become more accurate. Also included in this schema are Rack Cooling Index (RTI) and Return Temperature Index (RTI) Calculated Assets, which are used to determine compliance with data center thermal guidelines.

This schema is also designed to handle all of the data provided by all models of RF Code environmental monitoring sensor tags including:

- Temperature sensor tags
- Humidity and Temperature sensor tags
- Fluid sensor tags
- Door sensor tags
- Dry Contact sensor tags
- PDU sensor tags
- Differential air pressure tags

The schema contains the following **Asset Types** in the following Asset Type Hierarchy:

xxx-yyy	DRAFT XXXI	7/2/2015
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- Asset
 - Inventory
 - IT Equipment
 - Computer
 - Desktop
 - Desktop
 - Laptop
 - Server
 - Tablet
 - Monitor
 - CRT Monitor
 - LCD Monitor
 - LED Monitor
 - Plasma Monitor
 - Network Equipment
 - Firewall
 - Router
 - Switch
 - VPN
 - Other IT Equipment
 - Backup Storage
 - UPS System

- Printer
 - Networked Printer
 - Peripheral Printer
- Office Equipment
 - Copier
 - Projector
- Other Equipment
- Person
 - Employee
 - Visitor
- Vehicle
 - Car
 - Forklift
 - Trailer
 - Truck
 - Van
- Sensor
 - Differential Pressure
 - Door
 - Dry Contact
 - Fluid
 - PDU
 - PDU Breaker

- PDU Input Channel
- PDU Outlet
- PDU Phase
- Temperature - Humidity
- Summary - Location
 - Campus
 - Building
 - Floor
 - Zone
 - Room
 - Country
 - State or Province
 - City
- IT Area
 - Computing Facility
 - Data Center
 - IT Room
 - Wiring Closet
 - CRAC Unit
 - Rack
 - Row of Racks

The schema contains the following **Asset Attributes**:

xxx-yyy	DRAFT XXXIV	7/2/2015
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- Airflow Position
- Asset Lifecycle Tracking
- Asset Purchase Order (document)
- Building Environmental Monitoring
- CRAC Airflow Position
- CRAC Cooling Capacity
- Color
- Desktop Form Factor
- Equipment Power Outlet 1
- Equipment Power Outlet 2
- Equipment Power Outlet 3
- Equipment Power Outlet 4
- Expected Service Life (Years)
- Include Asset Information
- IT Environmental Monitoring
- MAC Address (xx:xx:xx:xx:xx:xx)
- Manufacturer
- Model
- Monitor Power via PDU
- Operating System
- Outlet
- PCI Slots (quantity)
- Processor
- Projector Resolution

xxx-yyy	DRAFT XXXV	7/2/2015
---------	---------------	----------

- Purchase Date
- Purchase Terms
- Purchase Value (\$)
- Rack Capacity Monitoring
- Rack Environmental Monitoring
- Rack Equipment Form Factor
- Rack PDU 1
- Rack PDU 2
- Rack Position
- Rack Power Capacity
- Rack Power Monitoring
- Rack U Space Capacity
- Rack Weight Capacity
- RAM Amount (GB)
- Row Capacity Monitoring
- Row Environmental Monitoring
- Row Power Monitoring
- Screen Size
- Server Form Factor
- Server Use
- Storage or Disk Size (GB)
- System Criticality
- System U Height

xxx-yyy	DRAFT XXXVI	7/2/2015
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- System Weight
- Temperature Sensor Application
- Title
- Volumetric Air Flow Rate
- Warranty Term (months)

The schema contains the following **Calculated Asset Attributes**:

- Any Door Open
- Any Doors Last Opened
- Any Fluid Detected
- Any Sensor Offline
- Any Warranty Expired
- Asset Age (months)
- Asset Count
- Available Rack Weight Capacity (%)
- Available U Space Capacity (%)
- Average Asset Age (months)
- Average Asset Value (\$)
- Average Exhaust Temperature
- Average Humidity
- Average Intake Humidity
- Average Intake Temperature
- Average Return Humidity

xxx-yyy	DRAFT XXXVII	7/2/2015
---------	-----------------	----------

- Average Return Temperature
- Average Return Temperature (Weighted)
- Average Temperature
- Average Temperature Delta
- Calculated Max Alert Severity
- Cold Aisle Containment Door Link (Hidden)
- Cold Aisle Door Open
- CRAC Return Humidity Link
- CRAC Return Temp Link
- CRAC Supply Humidity Link
- CRAC Supply Temp Link
- CRAC Temperature
- Door Counter
- Door Opens per Day
- Equipment Active Power
- Equipment Apparent Power
- Exhaust Humidity Link (Hidden)
- Exhaust Temp Link (Hidden)
- Fluid Sensor Count
- Intake Humidity Link (Hidden)
- Intake Temp Link (Hidden)
- Last Door Opened
- Max Exhaust Humidity

xxx-yyy	DRAFT XXXVIII	7/2/2015
---------	------------------	----------

- Max Exhaust Temperature
- Max Intake Humidity
- Max Exhaust Temperature
- Maximum Humidity
- Maximum Temperature
- Minimum Humidity
- Minimum Temperature
- Minimum Humidity
- Newest Asset Age (months)
- Oldest Asset Age (months)
- Rack Active Power
- Rack Apparent Power
- Rack Cooling Index - RCI(HI)
- Rack Cooling Index - RCI(LO)
- Rack Door Status Link (hidden)
- Rack Power % Capacity
- Rack Temperature Delta
- RCI(HI) Violation
- RCI(LO) Violation
- Return Temperature Index (RTI)
- Room Active Power
- Room Apparent Power
- Row Active Power
- Row Apparent Power

xxx-yyy	DRAFT XXXIX	7/2/2015
---------	----------------	----------

- Sensor Offline Link (Hidden)
- Total Asset Value (\$)
- Total Rack Cooling Index - RCI(HI)
- Total Rack Cooling Index - RCI(LO)
- Total Row Weight Capacity
- Total U Space Available (U's)
- Total U Space Capacity (U's)
- Total U Space Utilized (U's)
- Total Weight Available
- Total Weight Utilized
- Under Warranty
- Used U Space Capacity (%)
- Used Weight Capacity (%)
- Warranty Expiration Date
- Weighted CRAC Return Temp
- Weighted CRAC RTI Cooling
- Weighted CRAC Supply Temp

The schema contains the following **Custom Attribute Types**:

- Asset Lifecycle Profile
- Building Environmentals
- Computing Facility Environmentals
- CRAC Airflow Profile

xxx-yyy	DRAFT XL	7/2/2015
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- CRAC Environmentals
- Door Sensor Profile
- Location
- Power Outlet Monitoring Profiles
- Rack Asset Information
- Rack Capacity Profiles
- Rack Environmental (Sensors)
- Rack Power Profiles
- Row Capacity Profile
- Row Environmental Tracking
- Row Power Tracking
- Temp Airflow Profile
- Temperature Sensor Profile

User Role Matrix

The following table provides a matrix of functions within the User Console that are enabled or disabled for each of the User Roles to which you can assign a user of Asset Manager.

Task	Manager	Editor	Reporter with Alerts & Events	Reporter	Viewer
Dashboards - View	Yes	Yes	Yes	Yes	Yes
Dashboards - Create	Yes	Yes	No	No	No
Dashboards - Edit	Yes	Yes	No	No	No
Dashboards - Copy	Yes	Yes	No	No	No
Dashboards - Delete	Yes	Yes	No	No	No
Tag Management - Manage Tags	Yes	No	No	No	No

Task	Manager	Editor	Reporter with Alerts & Events	Reporter	Viewer
Tag Management - Tag Summary	Yes	No	No	No	No
Customization - Asset Templates	Yes	Yes	No	No	No
Customization - Views	Yes	Yes	No	No	No
Assets - Access Manage Assets View	Yes	Yes	Yes	Yes	Yes
Assets - Access Manage Assets by Location View	Yes	Yes	Yes	Yes	Yes
Assets - Access Manage Assets by Type View	Yes	Yes	Yes	Yes	Yes
Assets - Add/Edit Assets	Yes	Yes	No	No	No
Assets - View Asset Details	Yes	Yes	Yes	Yes	Yes
Assets - Retire/Unretired Assets	Yes	No	No	No	No
Assets - Delete Assets	Yes	No	No	No	No
Assets - Export Asset Data	Yes	Yes	Yes	Yes	Yes
Assets - Pause Updates	Yes	Yes	Yes	Yes	Yes
Assets - Change Views	Yes	Yes	Yes	Yes	Yes
Assets - Import Asset Data	Yes	Yes	No	No	No
Assets - Asset Builder Jobs	Yes	Yes	No	No	No
Maps - View Map Details	Yes	Yes	Yes	Yes	Yes
Reports/Graphs - Add/Edit Report/Graph Definition	Yes	Yes	Yes	Yes	No
Reports/Graphs - Run a Report or Graph	Yes	Yes	Yes	Yes	No
Reports/Graphs - View and Export Reports and Graphs	Yes	Yes	Yes	Yes	Yes

Task	Manager	Editor	Reporter with Alerts & Events	Reporter	Viewer
Report/Graph Actions - Create, Copy and Test	Yes	Yes	Yes	Yes	No
Report/Graph Actions - Delete	Yes	Yes	Yes	Yes	No
Report/Graph BIRT Templates - Create	Yes	Yes	Yes	Yes	No
Report/Graph BIRT Templates - Delete	Yes	Yes	No	No	No
Events Actions - Create, Copy and Test	Yes	No	No	No	No
Events Actions - Delete	Yes	No	No	No	No
Events Triggers - Create and Copy	Yes	No	No	No	No
Event Triggers - Delete	Yes	No	No	No	No
Alerts - View Alerts	Yes	Yes	Yes	No	No
Alerts - Delete Alerts	Yes	Yes	Yes	No	No
Alerts - Pause Updates	Yes	Yes	Yes	No	No
Alerts - Acknowledge Alerts	Yes	Yes	Yes	No	No
Alerts - Manage Alert Actions	Yes	No	No	No	No
Alerts - Manage Thresholds	Yes	No	No	No	No
Status Bar - Logout	Yes	Yes	Yes	Yes	Yes
Status Bar - About/Help	Yes	Yes	Yes	Yes	Yes
Status Bar - Switch Console Link	Yes	No	No	No	No
Status Bar - Display Open Alerts Information	Yes	Yes	Yes	No	No

Using Macros

Macros are variables specified during the configuration of some fields and which are replaced with actual values dynamically when the system sends or displays the attribute value. Macros can be used within:

- Email Action messages and addresses for Reports/Graphs, Events, and Alerts
- Directory paths and filenames for various actions
- The titles of dashboard widgets

Macros are inserted by specifying the macro name within the text value of a field that supports macros, prefaced with a dollar sign and enclosed between curly brackets.

Macros for Reports and Graphs

Below is a table of the macros available for use with Report and Graph Email Actions.

xxx-yyy	DRAFT XLIV	7/2/2015
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Select Macro	
Macro	Description
DATE	The current date (year-month-day).
DAY	The current day of the month (2 digits).
FILTER_LOCATION	The report filter location.
FILTER_TYPE	The report asset type.
HOUR	The current hour of the day (2 digits, 24-hour).
ID	Report ID.
JOB_ID	Report job ID.
JOB_NAME	Report job name.
JOB_START_TIME	Report job start time.
JOB_STOP_TIME	Report job stop time.
MILLISECOND	The current milliseconds of the second (3 digits).
MINUTE	The current minute of the hour (2 digits).
MONTH	The current month (2 digits, January=01).
NAME	Report name.
SECOND	The current second of the minute (2 digits).
TIME	The current time (24-hour, hour-minute-second).
TIMESTAMP	The current time.
TIMEZONE_OFFSET	The current offset from GME (positive/negative digit plus 4 digits).
TYPE	Report type.
TYPE_ID	Report type ID.
YEAR	The current year.

Macros for Events and Alerts

Macros provide access to information from two sources. The first source is the Event or Alert itself. It is common to label the Event or Alert the date or time an event happened, or to display the name or description or configuration information from the Event or Alert template definition itself. This can be done using the various pre-defined macros as seen in the list below.

The other source of information that macros can use is the source entity for the Event or Alert. Because both Events and Alerts are generated from a source entity (for example, a Reader or a Zone Manager) you can use macros to display values from the entity that triggered the Event or Alert. To do this, specify the macro name "SOURCE" followed by a period followed by the ID of the attribute that you wish to display. These macros can also be used to generate a context-sensitive email address so that the appropriate contact can be notified in response to alerts or events.

Below is a table of the macros available for use with Event Email Actions.

Macro	Description
DATE	The current date (year-month-day).
DAY	The current day of the month (2 digits).
FILTER_LOCATION	The threshold's filter location
FILTER_TYPE	The threshold's filter asset type
HOUR	The current hour of the day (2 digits, 24-hour).
ID	Event ID.
MILLISECOND	The current milliseconds of the second (3 digits).
MINUTE	The current minute of the hour (2 digits).
MONTH	The current month (2 digits, January=01).
SECOND	The current second of the minute (2 digits).
SOURCE.attribute	Value of an attribute from the source of the event (eg. \${SOURCE.COLOR}).
SOURCE_ID	ID of the source which triggered the event.
SOURCE_TRIGGER_VAL...	The actual value from the source of the event for the first trigger attribute
SOURCE_TRIGGER_VAL...	The actual value from the source of the event for the second trigger attribute
SOURCE_TRIGGER_VAL...	The actual value from the source of the event for the third trigger attribute
TIME	The current time (24-hour, hour-minute-second).
TIMESTAMP	The current time.
TIMEZONE_OFFSET	The current offset from GME (positive/negative digit plus 4 digits).
TRIGGER_ATTRIBUTE1_ID	The first event trigger filter attribute ID.
TRIGGER_ATTRIBUTE1_...	The first event trigger filter attribute Name.
TRIGGER_ATTRIBUTE2_ID	The second event trigger filter attribute ID.
TRIGGER_ATTRIBUTE2_...	The second event trigger filter attribute Name.
TRIGGER_ATTRIBUTE3_ID	The third event trigger filter attribute ID.
TRIGGER_ATTRIBUTE3_...	The third event trigger filter attribute Name.
TRIGGER_ID	The ID of the trigger that triggered the event.
TRIGGER_OPERATOR1	The first event trigger filter attribute operator.
TRIGGER_OPERATOR2	The second event trigger filter attribute operator.
TRIGGER_OPERATOR3	The third event trigger filter attribute operator.
TRIGGER_TYPE	The type of the trigger that triggered the event.
TRIGGER_VALUE1	The first event trigger filter attribute value.
TRIGGER_VALUE2	The second event trigger filter attribute value.
TRIGGER_VALUE3	The third event trigger filter attribute value.
YEAR	The current year.

Below is a table of the macros available for use with Alert Email Actions.

Macro	Description
DATE	The current date (year-month-day).
DAY	The current day of the month (2 digits).
DESCRIPTION	The threshold start or resolve message.
FILTER_LOCATION	The threshold's filter location
FILTER_TYPE	The threshold's filter asset type
HOUR	The current hour of the day (2 digits, 24-hour).
ID	Alert ID.
MILLISECOND	The current milliseconds of the second (3 digits).
MINUTE	The current minute of the hour (2 digits).
MONTH	The current month (2 digits, January=01).
RESOLVE_TIME	Alert resolve time.
SECOND	The current second of the minute (2 digits).
SEVERITY	Alert severity.
SOURCE.attribute	Value of an attribute from the source of the alert (eg. \${SOURCE.COLOR}).
SOURCE_ID	ID of the source which triggered the alert.
SOURCE_THRESHOLD_V...	The actual value from the source of the alert for the first threshold attribute
SOURCE_THRESHOLD_V...	The actual value from the source of the alert for the second threshold attribute
SOURCE_THRESHOLD_V...	The actual value from the source of the alert for the third threshold attribute
START_TIME	Alert start time.
STATE	The state of the alert (ie. open, acknowledged, resolved).
THRESHOLD_ATTRIBUTE1	The first threshold attribute ID
THRESHOLD_ATTRIBUTE1	The first threshold attribute Name
THRESHOLD_ATTRIBUTE2	The second threshold attribute ID
THRESHOLD_ATTRIBUTE2	The second threshold attribute Name
THRESHOLD_ATTRIBUTE3	The third threshold attribute ID
THRESHOLD_ATTRIBUTE3	The third threshold attribute Name
THRESHOLD_ID	The ID of the alert threshold which triggered the alert.
THRESHOLD_NAME	The name of the threshold which triggered the alert.
THRESHOLD_OPERATOR1	The first threshold attribute operator
THRESHOLD_OPERATOR2	The second threshold attribute operator
THRESHOLD_OPERATOR3	The third threshold attribute operator
THRESHOLD_TYPE	The type of the threshold which triggered the alert.
THRESHOLD_VALUE1	The threshold value that is set for the first threshold attribute
THRESHOLD_VALUE2	The threshold value that is set for the second threshold attribute
THRESHOLD_VALUE3	The threshold value that is set for the third threshold attribute
TIME	The current time (24-hour, hour-minute-second).
TIMESTAMP	The current time.
TIMEZONE_OFFSET	The current offset from GME (positive/negative digit plus 4 digits).
URL	The URL to the alert view.
YEAR	The current year.

The following macro will display an entity's description: \${ SOURCE.\$aDescription }

The replaced values for all macros available to the action (refer to the macro tables above), with the exception of the following macros, which only output a partial date or time: DATE, YEAR, MONTH, DAY, TIME, HOUR, MINUTE, SECOND, MILLISECOND, TIMEZONE_OFFSET.

NOTE: A few macros only output a partial date or time; these are: DATE, YEAR, MONTH, DAY, TIME, HOUR, MINUTE, SECOND, MILLISECOND, TIMEZONE_OFFSET.

Calculations and Functions Matrix

Below is a table of the common functions available for use within the Asset Manager software. Asset Manager functions are used in a similar way to the functions in the Microsoft Excel application.

Type	Function	Description
Count	count(*.attribute)	Count of assets with a specified attribute
Miscellaneous	abs(value)	Absolute value/Magnitude
Miscellaneous	binom(n, i)	Binomial coefficients
Miscellaneous	changed(attribute)	Returns true if any attribute's value changes
Miscellaneous	current(optional initial value)	Current value of attribute (argument is initial value)
Miscellaneous	filter(*.attribute, operator, value, default value)	Filter on an attribute
Miscellaneous	if(cond, trueval, falseval)	If condition, value if true, value if false
Miscellaneous	in(value, list)	Returns true if the value is equal to or is a descendant of a value specified in the list
Miscellaneous	isNull(attribute)	Checks if an attribute is null
Miscellaneous	mod(x,y)	Modulus
Miscellaneous	previous(attribute, default value)	Previous value of attribute is updated otherwise default value is supplied, (argument is attribute)

Type	Function	Description
Miscellaneous	rand()	Random number (between 0 and 1)
Miscellaneous	signum(value)	Signum (-1,0,1 depending on sign of argument)
Miscellaneous	sqrt(value)	Square root
Rounding	ceil(value)	Ceiling
Rounding	floor(value)	Floor
Rounding	round(value), round(value decimal places)	Round
Statistical	avg(*.attribute)	Average
Statistical	max(*.attribute)	Maximum
Statistical	min(*.attribute)	Minimum
Statistical	sum(*.attribute)	Sum
String	len(string attribute)	Length of string (0 if null)
String	lower(string attribute)	Lower case string
String	trim(string attribute)	Trim leading/trailing blanks
String	upper(string attribute)	Upper case string
Time	date(year, months, day)	Date in YYYY, or YYYY, MM, DD format
Time	day(date)	Day of month given a date
Time	dayofweek(date)	Day of week (Sunday = 1, Monday = 2, etc.) given a date
Time	dayofyear(date)	Day of year given a date
Time	days(date)	Days since epoch given a date
Time	month(date)	Month of year (January = 1, etc.) given a date
Time	time()	Current time
Time	year(date)	Year given a date

Type	Function	Description
Update	update(target attribute, value) or update(asset reference, target attribute, value)	update an attribute

NOTE: When an expression involves multiple statements, the expressions are evaluated one at a time, from left to right. The last statement which is evaluated will be returned as the value of the calculated field attribute. If any exception occurs anywhere in the evaluation process, *null* is returned as the value of the calculated field.

Network Security with RF Code Readers and Asset Manager

In addition to configuring Asset Manager login and user login access, you can also secure your readers and Asset Manager within your network by disabling ports and web services, using SSL certificates, and/or locking down readers.

NOTE: By default, HTTP and HTTPS will use ports 6580 and 6581 respectively. However, these can be changed if necessary.

On an M250 Reader, web services can be turned off. You can lock a reader by restricting access to it except from one or more users with specific usernames and passwords. The server software will also need to use these login credentials in order to log in to the reader. Port 6500 is the only port required for proper operation. Ports 80, 443, and 6501 can be turned off. SSH can also be turned off.

Readers that appear too open and respond to every request in an unsecure manner can be locked down.

You will notice that you can also turn off the HTTPS port. This port is only used for the web interface; therefore, it is not absolutely necessary, although turning off this port will prevent you from being able to log into the web interface.

xxx-yyy	DRAFT L	7/2/2015
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The port that Asset Manager and Zone Manager both use to communicate with readers is the legacy port 6500; therefore, this is the only port that absolutely must remain open.

By default SSL is enabled (default HTTPS port 6581 is listening) with a self-signed SSL certificate. Steps for configuring a CA-signed SSL certificate can be found in the [Configuring SSL Certificates for use with RF Code Readers](#) section.

Blocking HTTP Access in Asset Manager

To configure Asset Manager to block HTTP access from external requests, perform the following steps:

1. From the host running Asset Manager, go to **Control Panel > Administrative Tools > Services** and stop the **Asset Manager** service.
2. Edit the **System Properties** file in {Asset Manager Install Path}\conf directory by removing the line “**http.port=6580**”
3. Save the file.
4. Re-start the **Asset Manager** service.

Now, only localhost can get to port 6580. A request from an external host cannot.

Using SSL Certificates with RF Code Readers

By default, when HTTPS is enabled, a self-signed 10-year SSL certificate is generated so that communication on the HTTPS port is encrypted. To communicate with both encryption and authentication, an SSL certificate must be digitally signed by a well-known certificate authority (CA). Contact your Network or System Administrator to obtain a signed SSL Certificate.

First, you will need to generate a private key or use a certificate authority to create one. You will need a private key to generate a CSR, and then submit the CSR to a certificate authority.

1. Obtain a private key using a preferred tool or use a certificate authority to provide this service.

xxx-yyy	DRAFT LI	7/2/2015
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NOTE: Archive the key and file in a safe place for security purposes. This key will be needed later when you configure the SSL certificate.

A Certificate Signing Request (CSR) is then generated based on the private key.

2. Submit the CSR to a certificate authority.

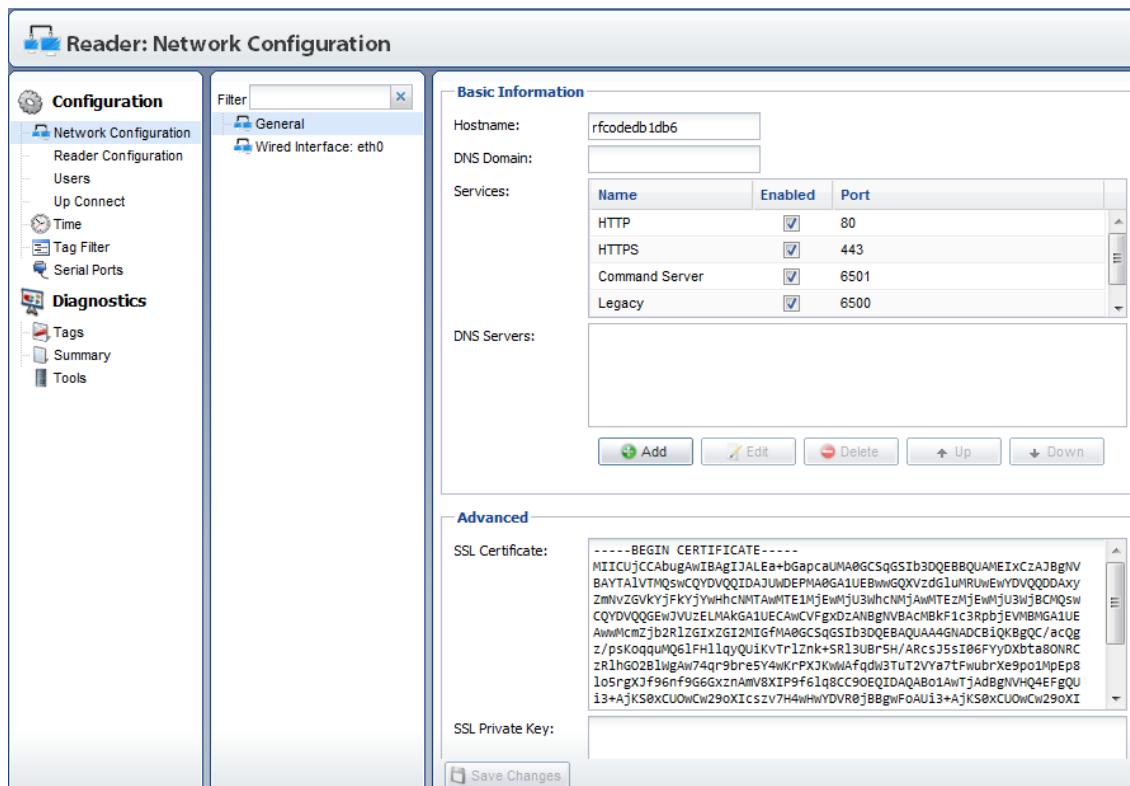
The certificate authority then issues an SSL certificate (in a PEM format) based on the CSR.

Configuring SSL for RF Code Readers using the Reader Web Interface

After you get a signed SSL certificate from a certificate authority, import it to the reader.

To configure the reader with an SSL Certificate, perform the following steps:

1. In the reader web interface, browse to **Configuration > Network > General**.



The screenshot shows the 'Reader: Network Configuration' page. The left sidebar has 'Configuration' and 'Diagnostics' sections. Under 'Configuration', 'Network Configuration' is expanded, showing 'Reader Configuration', 'Users', 'Up Connect', 'Time', 'Tag Filter', and 'Serial Ports'. Under 'Diagnostics', there are 'Tags', 'Summary', and 'Tools'. The main area has a 'Basic Information' section with fields for Hostname (rfcodedb1db6), DNS Domain, and Services (HTTP, HTTPS, Command Server, Legacy). It also has a 'DNS Servers' section and a table of services with columns for Name, Enabled, and Port. Below this is an 'Advanced' section with 'SSL Certificate' and 'SSL Private Key' fields, both containing large amounts of PEM-formatted certificate and key data respectively. A 'Save Changes' button is at the bottom of the Advanced section.

2. Open the PEM file and copy the portion of the SSL certificate in the PEM from **BEGIN CERTIFICATE** to **END CERTIFICATE** and then paste it into the **SSL Certificate** field in the **Advanced** area.
3. Copy the private key and paste it to **SSL Private Key** field.
4. Click the **Save Changes** button for the signed SSL certificate to take effect.

NOTE: If the SSL Certificate and the SSL Private Key do not match, the signed SSL certificate configuration will not be successful. If the SSL certificate configuration fails, for whatever reason, then the default self-signed certificate for the reader will be applied.

TIP: If the reader setup process fails and you cannot access the reader, then you can reset the reader back to its factory defaults. For more information, refer to the following article:
support.rfcode.com/customer/portal/articles/746969

After configuring the reader in the web interface, you must also configure **Asset Manager** (or the **Zone Manager** for the specific reader) so they will accept the SSL configuration that you just enabled.

Configuring Asset Manager to Accept SSL Configurations

After configuring SSL for a reader with the reader web interface, perform the following steps in Asset Manager:

1. In the **Admin Console**, navigate to **Configuration > Readers**.

The Reader configuration screen will appear.

In the center column is the tree of installed readers and in the right column are the fields you can configure for any reader you highlight in the center column.

xxx-yyy	DRAFT LIII	7/2/2015
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The screenshot shows the 'Asset Manager Administration: Readers' interface. On the left, a sidebar lists various configuration options like Dashboard, Configuration, Database, License Keys, SMTP Server, Import Configuration, Export Configuration, Tag Groups, Zone Managers, Zone Manager Status, Readers (selected), Reader Firmware, Reader Status, GPS, Serial Devices, and Server. The main panel shows a list of readers with 'rfcodedb1db6' selected. The configuration details for this reader are displayed in the right panel, including fields for Name, Zone Manager, Description, Enabled, Hostname, Port, SSL Mode (set to 'IFAVAIL'), and Authentication (dropdown menu showing 'OFF', 'IFAVAIL', 'REQUIRED', and 'STRICT').

NOTE: If you need to add a new reader or want more information about the other configuration fields available for a reader, refer to the [Advanced Reader Configuration](#) section. If you do add another reader, then it will also appear in the middle column.

NOTE: If you have more than one Zone Manager configured, you must select the appropriate Zone Manager to which the Reader will be associated and you must ensure that the reader is properly configured in each Zone Manager. If you have only a single Local Zone Manager configured, then all readers will be associated with that one Local Zone Manager.

2. Set the SSL Mode and then click the **Save Changes** button.

- **OFF** : to turn SSL mode OFF on the reader
- **IFAVAIL** : to use SSL on the reader, if it is available
- **REQUIRED** : to require the use of SSL
- **STRICT** : to authenticate the matching hostname

NOTE: If the SSL Mode is set to STRICT and the hostnames do not match, then the reader will not connect.

NOTE: Asset Manager needs to have the third-party Root CA Certificate to verify the CA certificate installed on the web servers. The Java library that comes with Asset Manager by default includes well-known third-party Root CA Authorities. If the SSL certificate of the target web server is included in Java library, this step does not apply. In the case where an SSL certificate installed on the target web server is not issued by any authorities in Java library, you may manually import Root CA certificate for that authority to keystore of Asset Manager.

```
jre\bin\keytool -importcert -file <Root CA certificate file> -key-store conf\keystore
```

NOTE: The command to import a Root CA will always prompt for the password to Asset Manager's keystore. The default password for Asset Manager's keystore is "rfcode". Re-importing a Root CA certificate is NOT required if Asset Manager is upgraded to the next version.

Encryption with Key Pairs

Asset Manager and all RF Code readers support SSL based on x.509 certificates. These can be generated using key pairs in a wide variety of formats. Some of the encryption keys generated in the process of building these certificates can be generated using passcodes (passkeys). However, this portion of the key-generation process is irrelevant to the process of verifying the validity of the key pairs during SSL processing.

SNMP V1 and V3 Trap Formatting

In order to integrate with NMS systems, you must use the following trap format and trap functions.

Traps coming from Asset Manager have a base OID of: 1.3.6.1.4.1.32410.

The following trap-specific content is available:

1.3.6.1.4.1.32410.100.1.0: The name of the alert which caused the trap (Octet String).

1.3.6.1.4.1.32410.100.2.0: The GUID of the alert which caused the trap (Octet String).

xxx-yyy	DRAFT LV	7/2/2015
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1.3.6.1.4.1.32410.100.3.0: The type of the alert which caused the trap (Octet String).

1.3.6.1.4.1.32410.100.4.0: The current state of the alert which caused the trap (Integer 32).

1.3.6.1.4.1.32410.100.5.0: The configured alert message from the alert threshold (Octet String).

1.3.6.1.4.1.32410.100.6.0: The attribute guid which is the alerting condition from the alert threshold (Octet String).

1.3.6.1.4.1.32410.100.7.0: The attribute value which is the alerting condition from the alert threshold (Octet String).

1.3.6.1.4.1.32410.100.8.0: The severity of the alert (Integer32).

1.3.6.1.4.1.32410.100.9.0: The alert start time (Octet String).

1.3.6.1.4.1.32410.100.10.0: The alert resolve time if resolved (Octet String).

1.3.6.1.4.1.32410.100.11.0: The alert asset GUID (Octet String).

1.3.6.1.4.1.32410.100.12.0: The number of attributes contained in the attribute table (Unsigned Integer 32).

1.3.6.1.4.1.32410.100.200.1.x.x: This is the table (ID range) containing additional alert attribute values.

1.3.6.1.4.1.32410.100.200.1.1.1: The first attribute value index (Unsigned Integer 32).

1.3.6.1.4.1.32410.100.200.1.1.2: The first attribute value GUID (Octet String).

1.3.6.1.4.1.32410.100.200.1.1.3: The first attribute value (Octet String).

1.3.6.1.4.1.32410.100.200.1.1.4: The second attribute value index.

1.3.6.1.4.1.32410.100.200.1.1.5: The second attribute value GUID.

1.3.6.1.4.1.32410.100.200.1.1.6: The second attribute value.

1.3.6.1.4.1.32410.100.200.1.1.7: The third attribute value index.

1.3.6.1.4.1.32410.100.200.1.1.8: The third attribute value GUID.

1.3.6.1.4.1.32410.100.200.1.1.9: The third attribute value.

Exporting and Importing

System configuration files, data schemas, and data files of assets with their associated attributes can be exported from and imported to Asset Manager. System administrator access is required to export or import system configurations and data schemas. Some user roles have permission to export and import assets. Exported files can be retained as backups, but are generally used as templates for uploading large amounts of data rather than entering information manually.

Export System Configuration or Data Schema

1. Navigate to **Admin Console > Configuration > Export Configuration**. By default, all system configuration variables are selected, and the Binary Data box is unchecked.

 Asset Manager Administration: Export Configuration

Bookmarks   

-  Dashboard 
-  Configuration 
 -  Database
 -  License Keys
 -  SMTP Server
 -  Import Configuration
 -  Export Configuration 
 -  Tag Groups
 -  Zone Managers
 -  Zone Manager Status
 -  Readers
 -  Reader Firmware
 -  Reader Status
 -  GPS
 -  Serial Devices
 -  Server
-  Integration 
-  Locations / Rules / Maps 

Export System Configuration -

SMTP Configuration:

Zone Managers, Readers, & Tag Groups:

Locations & Rules:

Users:

Alert Actions & Alert Thresholds:

Asset Templates & Views:

Dashboards:

Folders:

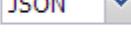
Maps & Map Views:

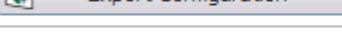
Reports, Graphs, & Actions:

Event Triggers & Actions:

Integration:

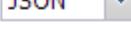
Binary Data:

Format: 



Export Schema -

Binary Data:

Format: 



2. If you have included image files or other non-textual data in your database, select **Binary Data**. Otherwise, leave unchecked.
3. Select desired file type, either **JSON** or **CSV**.

NOTE: If Binary Data is included, the export will download as a compressed ZIP file including that binary data and the configurations in the selected file type.

4. Click the desired **Export...** button.

Export Assets

Users can export a basic asset file to use as a template, in order to populate the file with assets and asset attributes and then import those assets, attributes, and tags back into the Asset Manager database.

1. Navigate to **User Console > Assets**.

The screenshot shows the 'Asset Manager: Manage Assets' page. On the left is a navigation sidebar with links like Dashboard, Tag Management, Customization, Assets (Manage Assets, Manage Assets By Location, Manage Assets By Type), Import Assets, Asset Builder Jobs, Access Control, Maps, Reports / Graphs, Events, and Alert Management. The main area has a search bar at the top right. Below it is a table header with columns: Type, Location, Status, Attribute, Operator, Value, Asset Type, Asset Tag, Asset Location, Expected Location(s), and In Expected Locat. The table body contains numerous rows of asset data, such as 'Low Battery' assets named 'BeausTesting', 'Just another Asset', 'atest', 'test asset2', etc., and 'TEST BADGE TAG - JIM' assets. At the bottom of the table are pagination controls (Page 1 of 286) and a row limit selector (Rows: 25).

2. Click **Export**.

This screenshot shows the same 'Asset Manager: Manage Assets' interface as above, but with a modal dialog box titled 'Export Assets' overlaid. The dialog has three sections: 'Export Style' (radio buttons for 'Simple Export (Human readable data - File cannot be re-imported.)' and 'Advanced Export (Complex data for modification - File can be re-imported.)'), 'Attributes to Export' (radio buttons for 'Export all asset attributes' and 'Export asset attributes in view'), and 'Include binary data' (checkbox). At the bottom of the dialog are 'Export JSON' and 'Export CSV' buttons, and a 'Cancel' button. The background table and sidebar are visible through the dialog.

3. Select the desired Export Style. Generally, **Advanced Export** is required, so it is selected by default. Simple Export files are suitable for printing.
 1. Export asset references by name if you prefer alphabetical sorting.
4. Select the Attributes to Export. By default, all assets and attributes are exported. If you have applied a filter to your assets and wish to export only the results of that filter, select **Export asset attributes in view**.
5. Include or exclude binary data. Check to include maps or other image files in your export.
6. Select desired file type to export. Click **Export JSON** or **Export CSV**. CSV files can be manipulated with a spreadsheet program such as Microsoft Excel.

Import Assets

CSV, JSON, or compressed ZIP files containing CSV or JSON files can be edited and then re-imported into Asset Manager. Files cannot be created outside of Asset Manager and imported.

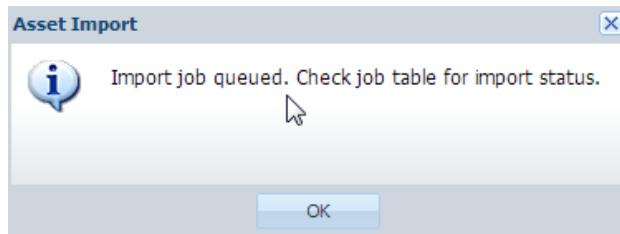
NOTE: Files can be exported from one instance or version of Asset Manager and imported to another.

NOTE: Asset files cannot be imported until the Asset Manager system is fully configured.

1. Navigate to **User Console > Assets > Import Assets**.

xxx-yyy	DRAFT LX	7/2/2015
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2. Click the **Browse** button and find the file, and then click **Upload**.
3. A pop-up window will inform you the import job is queued. Click **OK**.



4. The Import Jobs pane will update, showing the status of your import and total number of assets imported.

Import Jobs					
<input type="button" value="Delete"/> <input type="button" value="OK"/>					
Submitter	Start Time	End Time	Job Filename	Job Status	Job Message
admin	2013-05-29 09:53:21	2013-05-29 09:53:22	assets-export-2012111311282...	COMPLETE	Assets: 55
admin	2013-05-29 09:45:32	2013-05-29 09:45:32	config-export-20121113112800...	COMPLETE	Types: 42 Assets: 102
admin	2013-05-29 09:31:07	2013-05-29 09:31:08	config-export-20121113112800...	COMPLETE_WITH_ERRORS	Types: 42 Assets: 101

5. If errors occurred, click **Download Errors** to view a report of failures.

Import System Configurations or Data Schemas

CSV, JSON, or compressed ZIP files containing CSV or JSON files can be edited and then re-imported into Asset Manager. Files cannot be created outside of Asset Manager and imported.

NOTE: Files can be exported from one instance or version of Asset Manager and imported to another.

1. Navigate to **Admin Console > Configuration > Import Configuration**.
2. Click the **Browse** button and find the file, and then click **Upload**.
3. A pop-up window will inform you the import job is queued. Click **OK**.
4. The Import Jobs pane will update, showing the status of your import.

NOTE: When Asset Manager imports a file, the import file is parsed and validated. If an error general to the entire file is encountered, the import process is terminated. If an error specific to a single data type or record is found, the import job continues. If not all data imports successfully, the data that was not imported is presented in a file of the same type as the import; that is, a CSV import file generates a CSV error file and a JSON import with errors generates a JSON file.

The file contains each entity that failed to import and an error message beneath it giving the reason why.

The screenshot shows the 'Import Jobs' section of the Asset Manager. At the top, there's a 'Select the asset file to import' input field containing 'C:\fakepath\assets-export-20121113112825.zip', a 'Browse...' button, and an 'Upload' button. Below this is a table titled 'Import Jobs' with columns: Submitter, Start Time, End Time, Job Filename, Job Status, Job Message, and Job Error Filename. One row is shown for 'admin' with the following details: Start Time 2013-05-29 09:20:41, End Time 2013-05-29 09:20:41, Job Filename assets-export-20121113112825.zip, Job Status FAILURE, Job Message, and Job Error Filename import-errors-20130529092041.json. There is a 'Delete' link next to the first column and a 'Download Errors' link next to the 'Job Error Filename' column.

Submitter	Start Time	End Time	Job Filename	Job Status	Job Message	Job Error Filename
admin	2013-05-29 09:20:41	2013-05-29 09:20:41	assets-export-20121113112825.zip	FAILURE		import-errors-20130529092041.json

The following are all of the possible **Job Status** values for imports:

- **COMPLETE:** The import job completed successfully.
- **CREATED:** The import job was created, but it has not begun to import nor entered the import queue.
- **QUEUED:** The import job is waiting for another import job to finish importing.
- **RUNNING:** The file is currently importing.

- **COMPLETE WITH ERRORS:** The file imported some of the data, but not all of it. Asset Manager creates an updated import file containing only the items that the system could not successfully import. The user can then modify and correct the generated import file and attempt to reimport the corrected file. The system-generated error messages are ignored on import so the user does not have to remove this information when re-importing a corrected import file.
 - **FAILURE:** The file failed to import. Asset Manager creates an error log file of the same type as the import file, either CSV or JSON, containing information about the failures.
 - **ACCESS DENIED:** You do not have permission to import the file.
5. If an import completes with errors, click the **Download Errors** button to open the import file with annotated errors in order to determine which items did not import into the system and why. The error message is presented at the bottom of each entity's section so you can examine the characteristics of the entity to determine what needs to be fixed. Modify and re-import the file.

```

1  [ {
2    "class" : "entity",
3    "guid" : "DATA_CENTER_RACK_9f0cd986cd19d09c",
4    "retired" : false,
5    "deletable" : true,
6    "$aServiceDate" : "2012-11-07",
7    "RCILOW_VIOLATION" : false,
8    "RCIHI_VIOLATION" : false,
9    "MAX_EXHAUST_HUMIDITY" : null,
10   "RACK_COOLING_INDEX_LOW" : 100.0,
11   "$aName" : "Rack 02-01",
12   "$aExpectedLocation" : [ ],
13   "MAX_INTAKE_HUMIDITY" : 29,
14   "$aLocationPath" : "|$tLocation|IBM|HARDWARE_SAS_RAID10_SAS_DC1000_F1000",
15   "$aScope" : "$aLocation=RACK_02_01",
16   "type" : "DATA_CENTER_RACK",
17   "$aDescription" : "",
18   "TEMPERATURE_DELTA" : null,
19   "ANY_DOORS_LAST_OPENED" : null,
20   "$aLastUpdateTime" : "2012-11-08 18:34:41",
21   "$aLocation" : "RACK_02_01",
22   "$aLastUpdateUser" : "admin",
23   "MAX_INTAKE" : 28.5,
24   "RACK_COOLING_INDEX_HIGH" : 50.0,
25   "MAX_EXHAUST_TEMPERATURE" : null,
26   "ANY_SENSOR_OFFLINE" : true,
27   "ANY_DOOR_OPEN" : null,
28   "RACK_ENVIRONMENTAL_MONITORING" : "INTAKE_AND_EXHAUST",
29   "$aError" : "Error: Attribute class: RCILOW_VIOLATION was not found."
30 }, {
31   "class" : "entity",

```

The Job Message column lists the number of Assets and/or Attributes that were successfully imported.

Import Jobs						
<input type="button" value="Delete"/>	Submitter	Start Time	End Time	Job Filename	Job Status	Job Message
	admin	2013-05-29 09:31:07	2013-05-29 09:31:08	config-export-20121113112800.zip	COMPLETE_WITH_ERRORS	Types: 42 Assets: 101

NOTE: Assets with respect to Import Jobs can be any entity other than an Asset Type or an Asset Attribute. An “Asset” that is counted in the Job Message column can be an Event, an Action, a Threshold, etc. The log file shows entities that failed to import.

```

1  [ {
2      "class" : "entity",
3      "guid" : "$tAssetTemplate_29497c68051e878f",
4      "retired" : false,
5      "deletable" : true,
6      "RACK_POSITION" : "",
7      "TEMP_PROFILE" : "IT_RACK_SENSOR",
8      "$aName" : "Temp 01-01",
9      "$aExpectedLocation" : [ ],
10     "$aTemplateAssetType" : "TEMPERATURE_HUMIDITY",
11     "$aTemplateName" : "Temp",
12     "type" : "$tAssetTemplate",
13     "$aDescription" : "",
14     "EXHAUST_HUMIDITY_LINK" : null,
15     "$aTemplateIdentifier" : "Temp",
16     "$aLocation" : "ROW_1",
17     "EXHAUST_TEMP_LINK" : null,
18     "AIRFLOW_POSITION" : "RACK_EXHAUST_TEMPERATURE",
19     "$aLockLocation" : true,
20     "$aError" : "Error: Attribute class: RACK_POSITION was not found."
21   }

```

NOTE: For more detailed information about entities in Asset Manager, refer to the [Asset Manager Data Model](#).

Import Location Hierarchy Using Spreadsheet

A location hierarchy is a top-down grouping of your locations, beginning with a large single category that contains all the others and then moving down, as from Country (US) to State (TX) to City (Austin, Dallas, Houston). Items within a level are peers; items one item up or down are said to be parents or children. The Location Hierarchy is unpopulated upon installation except for the top-level *Location* and an *Unknown Location*.

- File must be created in and exported from Asset Manager, then populated and imported into system.
- Every Location must have a unique name.

As a best practice, structure the levels of your Location Hierarchy to fit within Asset Manager's data schema. The schema's expected levels are:

- Country
- State
- City
- Campus
- Building
- Floor
- Zone
- Room

Use as many of these levels as are appropriate for current or anticipated needs.

1. Though it is not required, it is recommended that you create one or two locations manually before exporting a location configuration.
2. Navigate to **Admin Console > Export Configuration**. Deselect all variables except for **Locations & Rules**. Select CSV and click **Export Configuration**.

Asset Manager Administration: Export Configuration

Export System Configuration

SMTP Configuration:

Zone Managers, Readers, & Tag Groups:

Locations & Rules:

Users:

Alert Actions & Alert Thresholds:

Asset Templates & Views:

Dashboards:

Folders:

Maps & Map Views:

Reports, Graphs, & Actions:

Event Triggers & Actions:

Integration:

Stat Policy & Stat Packs:

Binary Data:

Format: **CSV**

Export Configuration

Export Schema

Binary Data:

Format: **CSV**

Export Schema

Current User: spolhemus | **The reader Jim's DF TEST is offline.** | 21 Open Alerts | Logout | Link | About | User Console

3. Open file in spreadsheet program.
4. Add Locations. Each location must have a unique name and a parent. All other fields are optional.
5. Save file.
6. **Browse** to and **Upload** the system configuration file.

Asset Manager Administration: Import Configuration

Import System Configuration
System Configuration File: Browse...

Import Jobs

Submitter	Start Time	End Time	Job Filename	Job Status	Job Message
No data to display					

Import Zone Manager Configuration

- Tag Group Configuration (groups.csv): Browse...
- Reader Configuration (readers.csv): Browse...
- Location Configuration (locations.csv): Browse...
- Rule Configuration (rules.csv): Browse...

Current User: spolhemus | **The reader Jim's DF TEST is offline.** | 21 Open Alerts | [Logout](#) | [Link](#) | [About](#) | [User Console](#)

NOTE: The location hierarchy is part of the system configuration. Use the Zone Manager configuration (bottom) task pane only to import Zone Manager configuration files.

The Asset Manager Data Model

Asset Manager uses an object-oriented programming paradigm. It includes *objects*, structures that contain both data and procedures, and *classes*, which are definitions of the data and procedures.

Object Types

An *object* is a location in the Asset Manager system. Variables, assets, and functions are all objects.

An *object type* is a composite datatype made up of all the attributes you assign to an asset and all the functions and procedures required to perform defined management and monitoring procedures.

The Asset Manager data model centers around the definition of and interaction with a family of core object types. Each of these object types plays a role in supporting and defining the behavior and features of the Asset Manager system, and many of the object types interact with one another to bring this about. Most of the object types require instances to have a globally unique object ID (“GUID”) – an alphanumeric, case-sensitive identifier string that must be unique and cannot be changed during an object's life cycle.

Entity

An *Entity* object represents a single instance of an asset or tag with one or more associated properties or attributes. Each Entity object has a single well-known attribute named “type” which represents the base type of the Entity. The type of the Entity corresponds to an existing Entity Type object. Each Entity must have a unique object ID. Entity objects provide the main interface for interacting with the Asset Manager.

An Entity object may have associated Attribute objects. Each Attribute corresponds to a single property of the Entity. The available attributes of the entity are defined by the entity's Entity Type objects.

A Asset Manager user may choose to either retire or purge an Entity. A retired Entity no longer records history but its previous history is still available to view. A purged Entity and any associated historical values are completely removed from the Asset Manager as if it never existed.

Attribute

An Attribute represents a single property of an Entity. Each Attribute has an associated value. The data type of the Attribute's value is described within the Attribute's associated Attribute Class object. Each attribute may store history depending on the “History Recorded” property of the Attribute Class.

Attribute Class

An Attribute Class represents the definition of an Attribute. Each Attribute Class must have a unique object ID.

An Attribute Class has the following properties.

Attribute Class Properties	
Name	Presentation Label

xxx-yyy	DRAFT LXVIII	7/2/2015
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Attribute Class Properties	
Description	Describes the attribute class in detail.
Deletable	Describes whether or not a user can delete this attribute class. Attribute Class objects defined by Asset Manager and not a user are marked as non-deletable.
Retired	If true, this attribute class is no longer accessible for editing. History can still be viewed. Updates to attributes of this class no longer occur.
History Recorded	If true, all changes to an attribute of this class are recorded in the history. If false, only the current value is stored.
Values	Used only by an enum Attribute Class. This is the list of strings in which each value corresponds to a specific enumerated value.
Inherit Attributes	If this attribute class's type is type-ref, then entities will inherit the value of the attribute defined on the entity type.
Constraint	One or more constraints on the value of attributes of this class. Double and long data types can be constrained by a minimum or maximum value. A string, password, or string-list can be constrained using a regular expression. A typeref, typeref-list, entityref and entityref-list values can be constrained by an Entity Type. For example, a user may constrain a location attribute to only values within the “Texas” Entity Type hierarchy.
Encoding	The type of encoding for a password attribute class. Blowfish and SHA-512 are supported.
Type	The data type for values of this attribute class. See the table below for the list of data types.
Use	<p>One of the following strings:</p> <ul style="list-style-type: none"> • info: Set by Asset Manager and not a user. Used for informational values, such as the version of an application, which are visible to a user • hidden: Set by Asset Manager and not a user. These values are not shown to a user. Asset Manager uses “hidden” values to associated

Attribute Class Properties	
	<p>metadata required to interact with an entity. For example, associating the tag type of a tag with a tag entity.</p> <ul style="list-style-type: none"> config: Asset Manager or a user may modify this attribute. All user created attributes are set to “config”. status: Set by Asset Manager and not a user. Used for status values set by Asset Manager which are visible to a user. For example, the motion value of a tag is determined by the Asset Manager and not a user.
ZName	Used only by Zone Manager. The ZName is an alias which points to Zone Manager's name for this attribute. For example, in Asset Manager the attribute may have the GUID of “\$aHost” while in Zone Manager the attribute is called “host”. In this case, the ZName value is “host”.

Attribute Class Data Types	
boolean	true/false
date	a single date such as December 22, 2011
double	8 bytes IEEE 754. Covers a range from 4.94065645841246544e-324d to 1.79769313486231570e+308d
entityref	A reference to an entity object. This is a simple association. The entity with this attribute does not inherit its entity referenced attributes.
entityref-list	A list of references to entity objects. This is a simple association. The entity with this attribute does not inherit its entity referenced attributes.
enum	An enumeration. The value of an attribute of this type is one of the values listed in the attribute class' “values” property.
long	8 bytes signed (two's complement). Ranges from -9,223,372,036,854,775,808 to

xxx-yyy	DRAFT LXX	7/2/2015
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Attribute Class Data Types	
	+9,223,372,036,854,775,807.
map	A hash table of values. A map must contain a “mapkeytype” and “mapvaluetype” entries which contain the data type of the hash table key and value. Currently map values may only be defined by the Asset Manager and not a user.
password	Holds a password value. The encoding used is specified by the attribute class’ “encoding” property.
string	a string
string-list	a list of strings
timestamp	a single date/time accurate to seconds
tyepref	A reference to an entity type object.
tyepref-list	A list of references to entity type objects.

Entity Type

Entity Types are objects representing the different types of Entity objects defined within the Asset Manager. Entity Types define the population of attributes that may be present on Entity objects. Each Entity Type must have a unique object ID.

Entity Types can be arranged in a hierarchy, by allowing one Entity Type to be specified as the “parent” of other Entity Types. Entity Type attributes also inherit from parent to child, so setting the “city” attribute of a parent Entity Type will cause that attribute to be “shown” on all of its children (and any descendants), unless those Entity Types provide their own value for the “city” attribute. A child Entity Type may override any of its parent Entity Type Attribute objects. A child may not however remove an Entity Type Attribute if its parent defines.

In most cases an Entity Type defines the attributes which make up an Entity unless the Attribute Class object has set the “Inherit Attributes” value to false. Setting “Inherit Attributes” can be useful for attributes of type “tyepref-list”. For example, an expected location attribute may contain more than one location. In this case the Entity object should not inherit the attributes of the expected location. The Entity should only inherit attributes of its actual location.

Entity Type Properties	
Name	Presentation label
Description	Describes this entity type in detail.
Deletable	Describes whether or not a user can delete this attribute class. Attribute Class objects defined by Asset Manager and not a user are marked as non-deletable.

Entity Type Attribute

Entity Type Attributes are objects representing user-defined attributes of an Entity Type.

Entity Type Attribute Properties	
Required	If true, upon creation of an Entity a user must provide a value for this attribute.
Static	A static entity type attribute is an attribute which is an instance of the Entity Type and not the Entity. In this case, the Entity Type stores the current value and the history of the attribute. For example, a location Entity Type defines a static attribute named “city” with the value “Austin”. All Entities which have a typeref attribute whose value is “location” then will also have an attribute named “city” with the value “Austin”. A non-static entity type attribute makes an attribute available for the Entity to define. For example, a “Server” Entity Type may have the attribute “RAM”. In this case different servers have different amounts of RAM therefore the “RAM” attribute should be non-static.
Deletable	Describes whether or not a user can delete this attribute class. Attribute Class objects defined by the Asset Manager and not a user are marked as non-deletable.
Value	For static attributes this defines the value of the attribute. For non-static attributes this defines a default value. When a user creates an Entity the non-static attribute is populated with the default value which the user may change.

Entity Type Attribute Properties	
Sort Priority	Defines the sort order for attributes on the Entity user interface (UI). Attributes with a lower sort priority are displayed first.
Category	Attributes with the same category are shown on the Entity UI grouped together within a titled box. Category has a lower precedence than sort priority as a result attributes with the same category may appear in two different titled boxes. For example, suppose an entity type contains attributes “city” with sort priority 100 and “state” with sort priority 300 both in the “location” category and a third attribute “host” with sort priority 200 and category “network”. In this example, the UI will have three titled boxes, “location”, “network” and “location”.

Allocating Memory to Asset Manager

The amount of memory allocated to the Asset Manager software by default may be sufficient for many installations. However, if the number of assets exceeds roughly 5,000, or the calculated field function is heavily used, additional memory resources may be required. Adding physical memory to the server that runs Asset Manager may help, but to fully utilize the free memory, the software must be redefined to allow Asset Manager to use more memory than the default.

To change the amount of memory being used by Asset Manager, edit the *system.properties* file and change the value of the memory directive. The following example sets the memory footprint to 2 GB or 2048 MB of memory:

```
wrapper.java.maxmemory=2048
```

Backing Up and Restoring the Asset Manager Database

As with any database, you should make periodic backups of the Asset Manager database.

Backup and Restore with SQL Server

If you are housing the Asset Manager database in Microsoft SQL Server, follow your standard SQL backup and restore procedure to backup and restore Asset Manager.

Database Backup and Restore without Microsoft SQL Management Studio

It may be necessary to backup and/or restore an RF Code SQL database without the ability to use the SQL Management Studio. In this case, you can use the following SQL commands and run them from the Windows SQL Server.

To backup an RF Code database called “daytona” (which is the default name assigned to the RF Code database when it is installed with the SQL Server Express option in the Asset Manager installation wizard) to a file named c:\\sqlback.bak, issue the following command on a Windows Command (cmd) prompt on the SQL Server, which may or may not be on the same server as the Asset Manager server application:

NOTE: SQL Server Express 2012 is bundled with a version of the SQL Management Studio; therefore, you can back up and restore SQL databases, such as the Asset Manager database, using that menu-driven utility.

SQL Express 2008 Syntax:

```
c:\\Users\\Administrator>sqlcmd -E -S localhost\\RFCASSETMGR -Q  
“BACKUP DATABASE [daytona] TO DISK='c:\\sqlback.bak'”
```

NOTE: “localhost\\RFCASSETMGR”= Installed by default by Asset Manager

“RFCASSETMGR” is the Database “instance” running on the local server (that is, “localhost”).

The actual database name, running within the SQL instance, is “daytona”

Backup and Restore with PostgreSQL

If you are using PostgreSQL to house your Asset Manager database and need to back it up and restore it, please refer to the [PostgreSQL documentation](#).

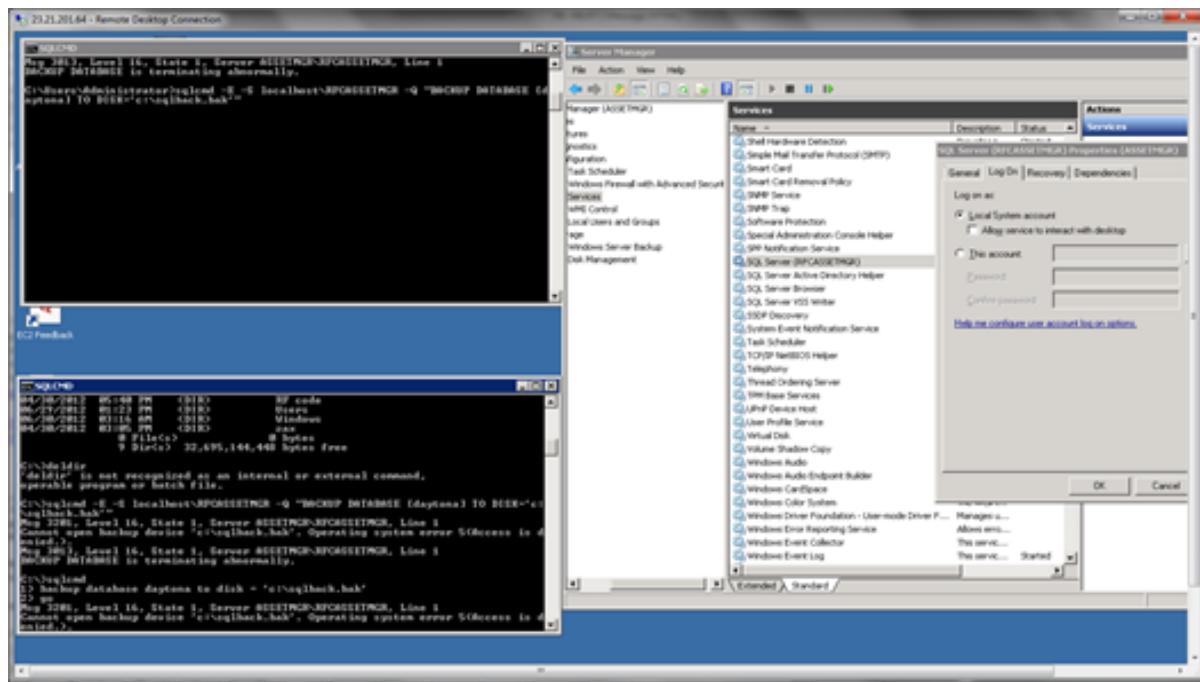
xxx-yyy	DRAFT LXXIV	7/2/2015
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Restoring the Database

To restore the RF Code SQL database, enter the command given below on the destination SQL server (if not the same one). In this example, the database is called “daytona” on the local server (to which SQL database needs to be restored). The WITH REPLACE option over-writes the existing “daytona” database:

```
c:\Users\Administrator>sqlcmd -E -S localhost\RFCASSETMGR -Q  
"RESTORE DATABASE [daytona] FROM DISK='c:\sqlbak.bak' WITH  
REPLACE"
```

NOTE: If during the Backup or Restore process an “Operating system error 5(Access is denied.)” error occurs, you will need to change the Windows Service (SQL Server (RFCASSETMGR)) to run as a “Local System account.”



Upgrading Asset Manager

RF Code Asset Manager software upgrades can be obtained through registration. RF Code periodically offers Asset Manager enhancement packages and data schema packages. If you have

registered your software, you will receive an email regarding how to access and upgrade when the updates are available. The registration page is accessible at the following web page:

RFCODE.com/Resources/Support/Login

Request an upgrade download link from RF Code Support (support@rfcode.com).

NOTE: If you are upgrading from Sensor Manager to Asset Manager, the instructions are the same as the new installation executable accommodates for previous installations of Sensor Manager.

NOTE: If you are upgrading multiple Zone Managers, upgrade them prior to upgrading Asset Manager. If the Zone Manager was originally installed from the Asset Manager installation package, you can use the downloaded image to upgrade the Zone Manager instances; otherwise, you will need to request a Zone Manager upgrade image as a separate request to RF Code Support.

NOTE: Beginning with Asset Manager version 2.5, a 64-bit operating system is required. For full system requirements, refer to [System Requirements for Asset Manager](#). If you are using a version of Asset Manager between 2.3.3 and 2.5 and it is installed in a 32-bit operating system, you will need to find or create a suitable 64-bit installation environment.

After receiving the new version of Asset Manager, perform the following steps:

1. Download and unzip the upgrade image.
2. Back up your entire (full) database using your normal database utilities (for example, SQL Server Management Studio, pg_dump/psql, etc.), including all configuration settings and all historical data. (Depending on the size of your database, the backup/migration may take some time.)
3. On the Asset Manager server, run the installer from the unzipped image.

xxx-yyy	DRAFT LXXVI	7/2/2015
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4. Login to Asset Manager and confirm that all of your settings are configured as they were and all your data is there.

Migrating the Asset Manager Server Application

If you need to replace the hardware on which your Asset Manager instance is running, use this procedure to migrate your data. Server migration, the process in which data is moved from one server to another, may be required for security reasons or because hardware is being upgraded, replaced or repaired.

NOTE: This procedure presumes the database resides on a separate server. If the database and Asset Manager reside on a single server, as is the case when SQL Express is used, back up the local database and restore to the new hardware using the vendor's database tools before completing this procedure.

1. If the old Asset Manager system is still running, allow it to continue running until step 6. This may also be a good opportunity to execute a backup of the database prior to switching over.
2. Make sure database credentials are handy or copy the system.properties file for use on the new system.
3. Install Asset Manager on the new hardware but do not check on the "Install SQL Express" box.
4. When the installation is complete log into the new Asset Manager. The database configuration dialog should come up first.
5. Enter the credentials into the various fields but **DO NOT click OK**. Use the Test function to verify that the database connection will work. When it returns with a successful connect proceed to the next step. If there are problems connecting, troubleshooting should begin at this time.
6. On the old system still running Asset Manager, stop the service and disable it in the services menu. You may also want to uninstall the software as well so that there is no possibility of the system ever connecting to the database again. It is *critical* that the database must not be used

xxx-yyy	DRAFT LXXVII	7/2/2015
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by two instances of Asset Manager at the same time. Doing so will cause irreparable corruption to the data and configuration settings.

7. Backup the database.
8. On the new system, if you are not copying over the system.properties file, click **OK** on the database dialog. If you are using the previous system.properties file, then stop the Asset Manager Server and place the file in c:\program Files\RF Code\Asset Manager\conf\ (or whatever similar path your installation might be) and start the service again. In either case, after 5-7 minutes log into the software.
9. Check the Zone Manager status in the Administration Menu. Due to a credential mismatch, the Zone Manager may be shown in an offline condition with the error “Access Denied”. If this happens, then the service must be shutdown and the contents of the folder c:\Program Files\RF Code\Asset Manager\zonemgr. datadir* deleted. Restart the service and the local Zone Manager should be online again.

RF Code Support and Professional Services

For additional information about functionality that is not described in this document, please visit the RF Code [Support website](#) and/or contact RF Code Support. To request additional features not included in the system, please contact RF Code Professional Services.

For more information about RF Code Professional Services, refer to:

RFCODE.com/solutions/professional-services

xxx-yyy	DRAFT LXXVIII	7/2/2015
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